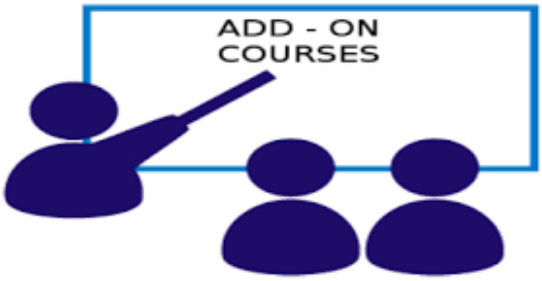
PVKN Govt. College (A), Chittoor
Department of Chemistry

“CHEMISTRY OF MILK”



ADD-ON COURSE

RESOURCE PERSONS

Dr. P. Bhanuprakash, Lecturer in Chemistry

Sri A. Ramesh, Lecturer in Chemistry

Dr. D. Srividya, Lecturer in Chemistry

Sri M. Mallikarjuna Reddy, Lecturer in Chemistry

2022-23

DEPARTMENTAL MINUTES-RESOLUTION TO START NEW ADD-ON COURSE

PVKN Govt. College (A), Chittoor
Department of Chemistry

BOARD OF STUDIES MEETING: 27-10-2022

The 8th meeting of BOS in Chemistry is to be held on 27-10-2022 at Chemistry Department through blended (online & offline) mode.

Agenda:

1. Approval for Revised UG CBCS Chemistry Course structure w.e.f. 2020-21.
2. Approval for upgradation and revision in the UG (B.Sc) I Semester paper entitled **"Inorganic &Physical Chemistry"** Course outcomes, syllabus, blue print, and model question paper.
3. Approval for revision in the UG (I B.Sc) I Semester practical paper entitled **"Analysis of Salt Mixture"** Syllabus and model question paper.
4. Approval for the upgradation and revision in the UG (II B.Sc) III Semester Paper-III entitled **"Organic Chemistry & Organic Spectroscopy"** Course outcomes, syllabus, blue print, and model question paper.
5. Approval for the revision in UG (II B.Sc) III Semester practical paper entitled **"Organic Preparations and IR Spectral Analysis"** Syllabus and model question paper.
6. Approval for introducing and redesigning of the **student chosen** new UG (III B.Sc) V Semester Paper-VI entitled **"Analytical Methods in Chemistry-1 (Skill Enhancement Course-1)"** Course outcomes, syllabus, blue print, and model question paper.
7. Approval for introducing and redesigning of the **student chosen** new UG (III B.Sc) V Semester practical paper-VI-P entitled **"Analytical Methods in Chemistry-1 Practical"** Syllabus and model question paper.
8. Approval for introducing and redesigning of the **student chosen** new UG (III B.Sc) V Semester paper-VII entitled **"Analytical Methods in Chemistry-2 (Skill Enhancement Course-2)"** Course outcomes, syllabus, blue print, and model question paper.

9. Approval for introducing and redesigning of the **student chosen** new UG (III B.Sc) V Semester practical paper-VII-P entitled **"Analytical Methods in Chemistry-2 Practical"** Syllabus and model question paper.
10. Approval for UG III Semester **Skill Development Course** entitled **"Environmental Audit"** Course outcomes, syllabus, blue print, and model question paper.
11. Approval for UG III Semester **Life Skill Development Course** paper entitled **"Environmental Education"** Course outcomes, syllabus, blue print, model question paper and question bank.
12. Approval for **first phase (2 months), second phase (2 months) and third phase of Industry Internship (6 months)** after second semester, fourth semester and in fifth or sixth semesters.
13. Panel of question paper setters and examiners.
14. Pedagogy of Teaching - Learning as per UGC guidelines and NEP-2020.
15. **Usage of Additional inputs** to the curriculum.
16. Continuous Internal Assessment (CIA) component and additional credits for extra-curricular activities.
17. Evaluation and assessment pattern.
18. Certificate courses on the **Chemistry of Milk**.
19. Discuss on the identification of suitable industries for the internships.
20. Best practices of the department.
21. Co-curricular and extra-curricular activities of the department.
22. Procurement of Reference books, chemicals, glassware and lab equipment.
23. Any other proposal with the permission of the chair.

29/10/22

Signature of the BOS Chairman

Signature of the Members

27.10.22

PERMISSION LETTER TO START NEW ADD-ON COURSE

From
In-charge,
Department of Chemistry,
PVKN Govt. College (A),
Chittoor.

To
The principal,
PVKN Govt. College (A),
Chittoor.

Respected Madam,

Sub: Department of Chemistry, PVKN Govt. College (A), Chittoor - Start new add-on course from 12-12-2022- Request-Reg.

I am writing to request permission to start a new Add-on course on "Hands-On Training on Chemistry of Milk" at the Department of Chemistry, PVKN Govt. College (A) for the Chemistry students. We believe that the course curriculum will provide students with the necessary knowledge and skills to succeed in the field of chemistry.

The course will be in blended mode and will run for 30 hours. We will deliver high-quality instruction and mentorship to the students joined in the course. Please find the enclosed course curriculum and kindly consider our request to start a new Add-on course in the department.

Thanking you

Yours Sincerely

(P. Bhanuprakash)
LECTURER IN-CHARGE
DEPT. OF CHEMISTRY
P.V.K.N. GOVT. COLLEGE
CHITTOOR - 517 002

P.V.K.N. GOVT. COLLEGE (A), CHITTOOR
DEPARTMENTS OF CHEMISTRY
CIRCULAR/NOTICE

The Department of Chemistry of PVKN Govt. College (A), Chittoor is planned to offer 30 hours Add-on Course in "Chemistry of Milk". This course aimed at imparting skills on quality control techniques in the dairy industry that are essential for any student with chemistry as one of the major subjects.

Interested students should register their names in the Department of Chemistry on or before 05-12-2022 5:00 PM

Course Duration : 30 Hours

No of hours per week : 3-6 Hours

Eligibility: All B.Sc. students having chemistry as a major subject and M.Sc. Chemistry students are eligible for this value-added course.

Number of seats : 30

Date : The course starts on 12-12-2022.

For Registration:

Contact : **Dr. P. Bhanuprakash, In-charge, Department of Chemistry**

Mobile : **9492152931**

Email : **bhanu.reddy15@pvkngcchittoor.ac.in**

(P. Bhanuprakash)
LECTURER IN-CHARGE
DEPT. OF CHEMISTRY
P.V.K.N. GOVT. COLLEGE
CHITTOOR - 517 002

CERTIFICATE COURSE ON CHEMISTRY OF MILK

COURSE OUTCOMES

After completion the course, the student is able to

CO1	Comprehend the composition of milk
CO2	Understand different steps in dairy processing
CO3	Determine the adulterants present in milk

SYLLABUS

Theory Syllabus **15 hours**

I. CHEMISTRY OF MILK: **5 h**

Milk Composition – Physico Chemical properties of milk – Animal Feed and Environmental factors influencing the composition of milk – Milk lipids, Milk Proteins, Carbohydrates in milk– Minerals and Vitamins in Milk – Thermal stability of Milk.

II. DAIRY PROCESSING AND TECHNOLOGY: **6 h**

Dairy Processing: Milk collection, Transportation & Grading of milk –Standardization – Pasteurization – Homogenisation of milk - Packaging of milk – Cleaning and sanitation – Cleaning in place (CIP) System.

Dairy Technology: Manufacture of fat rich dairy products: Cream, Butter, Ghee, Ice cream – Concentrated and Dried milk products, Cheese and other fermented products – manufacture of Dahi – Yoghurt.

III. QUALITY ANALYSIS OF MILK: **4 h**

Determination of Specific gravity, fat, SNF, TS, Acidity & pH in milk and their significance and interpretation –Determination and significance of MBR Test- Common adulterants in milk and their detection techniques.

SYLLABUS

Practical Syllabus **15 hours**

1. Organoleptic test of Milk, lactometer test, Clot on boiling test, and Alcohol test to determine the overall quality of milk 3h
2. Determination of acidity of milk by titration method 3h
3. Protein Content Test (Formaldehyde Titration) 3h
4. Determination of fat by Gerber centrifuge method 3h
5. Detection of adulterants in milk and milk products 3h

Course Evaluation

a. Theory examination – 20M
b. Practical examination – 30M

Course Duration: 30 Hours

No of hours per week: 3 Hours

Eligibility: All B.Sc. students having chemistry as a major subject are eligible for this value-added course.

Number of seats: 30

Reference Books:

1. Dairy Science: Petersen (W.E.) Publisher – Lippincott & Company
2. Outlines of Dairy Technology – Sukumar (De) – Oxford University press
3. Indian Dairy Products – Rangappa (K.S.) & Acharya (KT) – AsiaPublishing House.
4. The technology of milk Proceesing – Ananthakrishnan, C.P., Khan, A.Q.and Padmanabhan, P.N. – Shri Lakshmi Publications.
5. Dairy India 2007, Sixth edititon.
6. Economics of Milk Production – Bharati Pratima Acharya Publishers.

(P. Bhanuprakash)
LECTURER IN-CHARGE
DEPT. OF CHEMISTRY
P.V.K.N. GOVT. COLLEGE
CHITTOOR - 517 002

PVKN Govt. College (A), Chittoor
Department of Chemistry
Certificate Course on "Chemistry of Milk"
Timetable

S.No	Date	Time	Name of the Lecturer	Theory/ Practical	Topic Covered
1	12.12.22	9:00-10:00am	-	-	**Inauguration of Certificate Course on "Chemistry of Milk**
2	12.12.22	4:00-5:00pm	Dr. P. Bhanuprakash	Theory	Milk Composition – Physico and Chemical properties of milk
3	15.12.22	9:00-10:00am	M. Mallikarjuna Reddy	Theory	Manufacture of fat rich dairy products
4	16.12.22	9:00-10:00am	Dr. D. Srividhya	Theory	Determination of Specific gravity
5	17.12.22	9:00-10:00am	A. Ramesh	Theory	**Dairy Processing**: Milk collection, Transportation & Grading of milk
6	19.12.22	9:00-10:00am	Dr. P. Bhanuprakash	Practical	Organoleptic test of Milk, lactometer test
7	19.12.22	4:00-5:00pm	Dr. P. Bhanuprakash	Practical	Organoleptic test of Milk, lactometer test
8	21.12.22	9:00-10:00am	Dr.D.Srividhya	Practical	Detection of adulterants in milk products
9	22.12.22	9:00-10:00am	Dr.D.Srividhya	Practical	Detection of adulterants in milk products
10	23.12.22	9:00-10:00am	Dr.P.Bhanuprakash	Theory	Animal Feed and Environmental factors influencing the composition of milk
11	24.12.22	9:00-10:00am	Dr.D.Srividhya	Theory	fat, SNF, TS, Acidity & pH in milk and their significance and interpretation
12	26.12.22	9:00-10:00am	A. Ramesh	Theory	Standardization – Pasteurization of milk
13	27.12.22	9:00-10:00am	M. Mallikarjuna Reddy	Theory	Cream, Butter, Ghee, Ice cream – Concentrated and Dried milk products
14	28.12.22	4:00-5:00pm	A. Ramesh	Theory	Homogenisation of milk - Packaging of milk
15	29.12.22	4:00-5:00pm	M. Mallikarjuna Reddy	Practical	Determination of acidity of milk by titration method
16	30.12.22	4:00-5:00pm	M. Mallikarjuna Reddy	Practical	Determination of acidity of milk by titration method

PVKN Govt. College (A), Chittoor
Department of Chemistry
Certificate Course on "Chemistry of Milk"
Timetable

S.No	Date	Time	Name of the Lecturer	Theory/ Practical	Topic Covered
17	31.12.22	9:00-10:00am	M. Mallikarjuna Reddy	Theory	Cheese and other fermented products
18	02.01.23	9:00-10:00am	Dr. P. Bhanuprakash	Practical	Clot on boiling test, and Alcohol test to determine the overall quality of milk
19	03.01.23	9:00-10:00am	Dr. P. Bhanuprakash	Practical	Clot on boiling test, and Alcohol test to determine the overall quality of milk
20	04.01.23	9:00-10:00am	A. Ramesh	Practical	Determination of fat by Gerber centrifuge method
21	05.01.23	9:00-10:00am	A. Ramesh	Practical	Determination of fat by Gerber centrifuge method
22	06.01.23	9:00-10:00am	M. Mallikarjuna Reddy	Theory	Manufacture of Dahi – Yoghurt
23	07.01.23	9:00-10:00am	A. Ramesh	Theory	Cleaning and sanitation – Cleaning in place (CIP) System
24	08.01.23	9:00-10:00am	Dr. D. Srividhya	Theory	Determination and significance of MBR Test
25	09.01.23	4:00-5:00pm	A. Ramesh	Theory	Cleaning in place (CIP) System
26	09.01.23	8:00-10:00am	Department of Chemistry	Practical	**Field Visit**
27	19.01.23	9:00-10:00am	Dr. P. Bhanuprakash	Theory	Milk lipids, Milk Proteins
28	20.01.23	9:00-10:00am	A. Ramesh	Practical	Detection of adulterants in milk
29	21.01.23	9:00-10:00am	A. Ramesh	Practical	Detection of adulterants in milk
30	23.01.23	4:00-5:00pm	Dr. P. Bhanuprakash	Theory	Minerals and Vitamins in Milk – Thermal stability of Milk
31	24.01.23	4:00-5:00pm	Dr. D. Srividhya	Theory	Common adulterants in milk and their detection techniques.

PHOTOS

(Practicals-Organoleptic Tests of Milk)

(Organoleptic test of Milk, lactometer test)

(Standardization – Pasteurization of milk)

(Cream, Butter, Ghee, Ice cream – Concentrated and Dried milk products)

(Determination of acidity of milk by titration method)

(Gerber method)

(Milk lipids, Milk Proteins)

DEPARTMENT OF CHEMISTRY

PVKN GC(A), CHITTOOR

PVKN GOVT.COLLEGE(A), CHITTOOR

DEPARTMENT OF CHEMISTRY

Attendance for Certificate Course on CHEMISTRY OF MILK"

S. No	Name of the student	Class/Group	Regd. No.	Signature of the Student				
				12.12.22(FN)	12.12.22(AN)	15.12.22	16.12.22	17.12.22
1	I. Sowmya	II B.Sc BZC	220302515	I. Sowmya	I. Sowmya	I. Sowmya	I. Sowmya	I. Sowmya
2	J. Mounika	II B.Sc BZC	220302517	J. Mounika	J. Mounika	J. Mounika	J. Mounika	J. Mounika
3	B. Prasanna	II B.Sc BZC	220302503	B. Prasanna	B. Prasanna	B. Prasanna	B. Prasanna	B. Prasanna
4	R. Yamini	II B.Sc BZC	220302537	R. Yamini	R. Yamini	R. Yamini	R. Yamini	R. Yamini
5	A. Kavya	II B.Sc BZC	220302501	A. Kavya	A. Kavya	A. Kavya	A. Kavya	A. Kavya
6	V. Sneha	II B.Sc BZC	220302546	V. Sneha	V. Sneha	V. Sneha	V. Sneha	V. Sneha
7	S. Poojitha	II B.Sc BZC	220302540	S. Poojitha	S. Poojitha	S. Poojitha	S. Poojitha	S. Poojitha
8	S. Nagaveni	II B.Sc BZC	220302539	S. Nagaveni	S. Nagaveni	S. Nagaveni	S. Nagaveni	S. Nagaveni
9	K. Thilak	II B.Sc BZC	220302520	K. Thilak	K. Thilak	K. Thilak	K. Thilak	K. Thilak
10	G. Vijayavani	II B.Sc BZC	220302512	G. Vijay	G. Vijay	G. Vijay	G. Vijay	G. Vijay
11	S. Ghousiya	II B.Sc BZC	220302541	S. Ghousiya	S. Ghousiya	S. Ghousiya	S. Ghousiya	S. Ghousiya
12	S. Ummisalma	II B.Sc BZC	220302542	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma
13	M. Gunasekhari	II B.Sc BZC	220302525	M. Gunasekhari	M. Gunasekhari	M. Gunasekhari	M. Gunasekhari	M. Gunasekhari
14	P. Abubakar Siddiq	II B.Sc BZC	220302530	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq
15	B. Divya	II B.Sc BZC	220302504	B. Divya	B. Divya	B. Divya	ABSENT	B. Divya
16	K. Bhavya	II B.Sc BZC	220302521	ABSENT	K. Bhavya	K. Bhavya	K. Bhavya	K. Bhavya
17	B.K. Swetha	II B.Sc BZC	220302502	B.K. Swetha	B.K. Swetha	ABSENT	B.K. Swetha	B.K. Swetha
18	C. Pavithra	II B.Sc BHC	220307504	C. Pavithra	C. Pavithra	C. Pavithra	C. Pavithra	C. Pavithra
19	G. Sai Swaroopa	II B.Sc BHC	220307508	G. Saiswaroopa	G. Saiswaroopa	G. Saiswaroopa	ABSENT	G. Saiswaroopa
20	D. Sandhya	II B.Sc BHC	220307505	ABSENT	D. Sandhya	D. Sandhya	D. Sandhya	D. Sandhya
21	B. Nagalakshmi	II B.Sc BHC	220307501	B. Nagalakshmi	B. Nagalakshmi	B. Nagalakshmi	B. Nagalakshmi	ABSENT
22	T.V. Deepthi	II B.Sc BHC	220307525	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi
23	K.S. Subhashini	II B.Sc BHC	220307516	K.S. Subhashini	ABSENT	K.S. Subhashini	K.S. Subhashini	K.S. Subhashini
24	G. Poojitha	II B.Sc BHC	220307507	G. Poojitha	G. Poojitha	G. Poojitha	G. Poojitha	ABSENT
25	J. Bhuvaneswari	II B.Sc BHC	220307511	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari
26	T.A. Sindhuja	II B.Sc BHC	220307524	T.A. Sindhuja	T.A. Sindhuja	ABSENT	T.A. Sindhuja	T.A. Sindhuja
27	J. Vinay Kumar	II B.Sc BHC	220307513	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar
28	G. Vijay	II B.Sc BHC	220307510	G. Vijay	G. Vijay	G. Vijay	G. Vijay	G. Vijay
29	T. Reddemma	II B.Sc BHC	220307526	T. Reddemma	T. Reddemma	T. Reddemma	T. Reddemma	T. Reddemma
30	P. Sridevi	II B.Sc BHC	220307522	P. Sridevi	P. Sridevi	P. Sridevi	P. Sridevi	P. Sridevi

DEPARTMENT OF CHEMISTRY

PVKN GC(A), CHITTOOR

PVKN GOVT.COLLEGE(A), CHITTOOR
DEPARTMENT OF CHEMISTRY
Attendance for Certificate Course on CHEMISTRY OF MILK"

S. No	Name of the student	Class/Group	Regd. No.	Signature of the Student				
				19.12.22 FN	19.12.22 AN	21.12.22	22.12.22	23.12.22
1	I. Sowmya	II B.Sc BZC	220302515	P	P	P	P	P
2	J. Mounika	II B.Sc BZC	220302517	P	P	P	P	P
3	B. Prasanna	II B.Sc BZC	220302503	P	P	P	ABSENT	P
4	R. Yamini	II B.Sc BZC	220302537	P	P	P	P	P
5	A. Kavya	II B.Sc BZC	220302501	P	ABSENT	P	P	P
6	V. Sneha	II B.Sc BZC	220302546	P	P	P	P	P
7	S. Poojitha	II B.Sc BZC	220302540	P	P	P	P	P
8	S. Nagaveni	II B.Sc BZC	220302539	P	P	P	P	P
9	K. Thilak	II B.Sc BZC	220302520	P	P	P	P	P
10	G. Vijayavani	II B.Sc BZC	220302512	P	P	P	ABSENT	ABSENT
11	S. Ghousiya	II B.Sc BZC	220302541	P	P	P	P	P
12	S. Ummisalma	II B.Sc BZC	220302542	P	P	P	P	P
13	M. Gunasekhari	II B.Sc BZC	220302525	P	P	P	P	P
14	P. Abubakar Siddiq	II B.Sc BZC	220302530	P	ABSENT	P	P	ABSENT
15	B. Divya	II B.Sc BZC	220302504	P	P	P	ABSENT	P
16	K. Bhavya	II B.Sc BZC	220302521	ABSENT	P	P	P	P
17	B.K. Swetha	II B.Sc BZC	220302502	P	P	ABSENT	P	P
18	C. Pavithra	II B.Sc BHC	220307504	P	P	P	P	P
19	G. Sai Swaroopa	II B.Sc BHC	220307508	ABSENT	P	P	ABSENT	P
20	D. Sandhya	II B.Sc BHC	220307505	P	P	P	P	P
21	B. Nagalakshmi	II B.Sc BHC	220307501	P	P	P	P	P
22	T.V. Deepthi	II B.Sc BHC	220307525	P	P	ABSENT	P	P
23	K.S. Subhashini	II B.Sc BHC	220307516	P	P	P	P	ABSENT
24	G. Poojitha	II B.Sc BHC	220307507	P	P	P	P	P
25	J. Bhuvaneswari	II B.Sc BHC	220307511	P	ABSENT	P	P	P
26	T.A. Sindhuja	II B.Sc BHC	220307524	P	P	P	P	P
27	J. Vinay Kumar	II B.Sc BHC	220307513	P	P	P	ABSENT	P
28	G. Vijay	II B.Sc BHC	220307510	P	P	P	P	P
29	T. Reddemma	II B.Sc BHC	220307526	P	P	P	P	P
30	P. Sridevi	II B.Sc BHC	220307522	P	P	P	P	P

DEPARTMENT OF CHEMISTRY

PVKN GC(A), CHITTOOR

PVKN GOVT.COLLEGE(A), CHITTOOR
DEPARTMENT OF CHEMISTRY
Attendance for Certificate Course on CHEMISTRY OF MILK"

S. No	Name of the student	Class/Group	Regd. No.	Signature of the Student				
				24.12.22	26.12.22	27.12.22	28.12.22	29.12.22
1	I. Sowmya	II B.Sc BZC	220302515	I. Sowmya	I. Sowmya	I. Sowmya	I. Sowmya	I. Sowmya
2	J. Mounika	II B.Sc BZC	220302517	ABSENT	J. Mounika	ABSENT	J. Mounika	ABSENT
3	B. Prasanna	II B.Sc BZC	220302503	B. Prasanna	B. Prasanna	B. Prasanna	B. Prasanna	ABSENT
4	R. Yamini	II B.Sc BZC	220302537	R. Yamini	R. Yamini	R. Yamini	R. Yamini	R. Yamini
5	A. Kavya	II B.Sc BZC	220302501	A. Kavya	A. Kavya	ABSENT	A. Kavya	A. Kavya
6	V. Sneha	II B.Sc BZC	220302546	V. Sneha	V	V. Sneha	V. Sneha	V. Sneha
7	S. Poojitha	II B.Sc BZC	220302540	S. Poojitha	S. Poojitha	S. Poojitha	S. Poojitha	S. Poojitha
8	S. Nagaveni	II B.Sc BZC	220302539	S. Nagaveni	S. Nagaveni	S. Nagaveni	S. Nagaveni	S. Nagaveni
9	K. Thilak	II B.Sc BZC	220302520	K. Thilak	K. Thilak	K. Thilak	K. Thilak	K. Thilak
10	G. Vijayavani	II B.Sc BZC	220302512	G. Vijay	G. Vijay	G. Vijay	G. Vijay	G. Vijay
11	S. Ghousiya	II B.Sc BZC	220302541	S. Ghousiya	S. Ghousiya	S. Ghousiya	S. Ghousiya	S. Ghousiya
12	S. Ummisalma	II B.Sc BZC	220302542	S. Ummi salma	S. Ummi salma	S. Ummi salma	S. Ummi salma	S. Ummi salma
13	M. Gunasekhari	II B.Sc BZC	220302525	M. Gunasekhari	ABSENT	M. Gunasekhari	M. Gunasekhari	M. Gunasekhari
14	P. Abubakar Siddiq	II B.Sc BZC	220302530	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq
15	B. Divya	II B.Sc BZC	220302504	B. Divya	ABSENT	B. Divya	B. Divya	B. Divya
16	K. Bhavya	II B.Sc BZC	220302521	K. Bhavya	K. Bhavya	K. Bhavya	K. Bhavya	K. Bhavya
17	B.K. Swetha	II B.Sc BZC	220302502	B.K. Swetha	B.K. Swetha	B.K. Swetha	B.K. Swetha	ABSENT
18	C. Pavithra	II B.Sc BHC	220307504	C. Pavithra	C. Pavithra	C. Pavithra	C. Pavithra	C. Pavithra
19	G. Sai Swaroopa	II B.Sc BHC	220307508	G. Saiswaroopa	G. Saiswaroopa	ABSENT	G. Saiswaroopa	G. Saiswaroopa
20	D. Sandhya	II B.Sc BHC	220307505	D. Sandhya	D. Sandhya	D. Sandhya	D. Sandhya	D. Sandhya
21	B. Nagalakshmi	II B.Sc BHC	220307501	ABSENT	B. Naga	B. Naga	B. Naga	B. Naga
22	T.V. Deepthi	II B.Sc BHC	220307525	T. V. Deepthi	T. V. Deepthi	T. V. Deepthi	T. V. Deepthi	T. V. Deepthi
23	K.S. Subhashini	II B.Sc BHC	220307516	K.S. Subhashini	K.S. Subhashini	K.S. Subhashini	K.S. Subhashini	ABSENT
24	G. Poojitha	II B.Sc BHC	220307507	G. Poojitha	G. Poojitha	G. Poojitha	G. Poojitha	G. Poojitha
25	J. Bhuvaneswari	II B.Sc BHC	220307511	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari
26	T.A. Sindhuja	II B.Sc BHC	220307524	T.A. Sindhuja	T.A. Sindhuja	ABSENT	T.A. Sindhuja	T.A. Sindhuja
27	J. Vinay Kumar	II B.Sc BHC	220307513	J. Vinay Kumar	ABSENT	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar
28	G. Vijay	II B.Sc BHC	220307510	G. Vijay	G. Vijay	G. Vijay	G. Vijay	G. Vijay
29	T. Reddemma	II B.Sc BHC	220307526	T. Reddemma	T. Reddemma	T. Reddemma	T. Reddemma	T. Reddemma
30	P. Sridevi	II B.Sc BHC	220307522	P. Sridevi	P. Sridevi	P. Sridevi	P. Sridevi	P. Sridevi

DEPARTMENT OF CHEMISTRY

PVKN GC(A), CHITTOOR

PVKN GOVT.COLLEGE(A), CHITTOOR
DEPARTMENT OF CHEMISTRY
Attendance for Certificate Course on CHEMISTRY OF MILK"

S. No	Name of the student	Class/Group	Regd. No.	Signature of the Student				
				30.12.22	31.12.22	02.01.23	03.01.23	04.01.23
1	I. Sowmya	II B.Sc BZC	220302515	I. Sowmya	I. Sowmya	I. Sowmya	I. Sowmya	I. Sowmya
2	J. Mounika	II B.Sc BZC	220302517	J. Mounika	J. Mounika	J. Mounika	J. Mounika	J. Mounika
3	B. Prasanna	II B.Sc BZC	220302503	B. Prasanna	B. Prasanna	B. Prasanna	B. Prasanna	B. Prasanna
4	R. Yamini	II B.Sc BZC	220302537	R. Yamini	R. Yamini	R. Yamini	R. Yamini	R. Yamini
5	A. Kavya	II B.Sc BZC	220302501	A. Kavya	A. Kavya	A. Kavya	A. Kavya	A. Kavya
6	V. Sneha	II B.Sc BZC	220302546	V. Sneha	V. Sneha	V. Sneha	V. Sneha	
7	S. Poojitha	II B.Sc BZC	220302540	S. Poojitha	S. Poojitha	S. Poojitha	S. Poojitha	S. Poojitha
8	S. Nagaveni	II B.Sc BZC	220302539					
9	K. Thilak	II B.Sc BZC	220302520	K. Thilak	K. Thilak	K. Thilak	K. Thilak	K. Thilak
10	G. Vijayavani	II B.Sc BZC	220302512	G. Vijayavani	G. Vijayavani	G. Vijayavani	G. Vijayavani	G. Vijayavani
11	S. Ghousiya	II B.Sc BZC	220302541	S. Ghousiya	S. Ghousiya	S. Ghousiya	S. Ghousiya	S. Ghousiya
12	S. Ummisalma	II B.Sc BZC	220302542	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma
13	M. Gunasekhari	II B.Sc BZC	220302525	M. Gunasekhari	M. Gunasekhari	M. Gunasekhari	M. Gunasekhari	M. Gunasekhari
14	P. Abubakar Siddiq	II B.Sc BZC	220302530	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq
15	B. Divya	II B.Sc BZC	220302504	B. Divya	ABSENT	B. Divya	B. Divya	B. Divya
16	K. Bhavya	II B.Sc BZC	220302521	K. Bhavya	K. Bhavya	ABSENT	K. Bhavya	K. Bhavya
17	B.K. Swetha	II B.Sc BZC	220302502	B.K. Swetha	B.K. Swetha	B.K. Swetha	ABSENT	B.K. Swetha
18	C. Pavithra	II B.Sc BHC	220307504	C. Pavithra	C. Pavithra	C. Pavithra	C. Pavithra	C. Pavithra
19	G. Sai Swaroopa	II B.Sc BHC	220307508	G. Saiswaroopa	G. Saiswaroopa	G. Saiswaroopa	G. Saiswaroopa	ABSENT
20	D. Sandhya	II B.Sc BHC	220307505	ABSENT	D. Sandhya	D. Sandhya	D. Sandhya	D. Sandhya
21	B. Nagalakshmi	II B.Sc BHC	220307501	B. Nagalakshmi	B. Nagalakshmi	ABSENT	B. Nagalakshmi	B. Nagalakshmi
22	T.V. Deepthi	II B.Sc BHC	220307525	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi
23	K.S. Subhashini	II B.Sc BHC	220307516	K.S. Subhashini	K.S. Subhashini	K.S. Subhashini	ABSENT	K.S. Subhashini
24	G. Poojitha	II B.Sc BHC	220307507	G. Poojitha	G. Poojitha	G. Poojitha	G. Poojitha	G. Poojitha
25	J. Bhuvaneswari	II B.Sc BHC	220307511	ABSENT	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari
26	T.A. Sindhuja	II B.Sc BHC	220307524	T.A. Sindhuja	T.A. Sindhuja	T.A. Sindhuja	T.A. Sindhuja	T.A. Sindhuja
27	J. Vinay Kumar	II B.Sc BHC	220307513	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar
28	G. Vijay	II B.Sc BHC	220307510	G. Vijay	G. Vijay	G. Vijay	G. Vijay	G. Vijay
29	T. Reddemma	II B.Sc BHC	220307526	T. Reddemma	T. Reddemma	T. Reddemma	T. Reddemma	T. Reddemma
30	P. Sridevi	II B.Sc BHC	220307522	P. Sridevi	P. Sridevi	P. Sridevi	P. Sridevi	P. Sridevi

DEPARTMENT OF CHEMISTRY

PVKN GC(A), CHITTOOR

PVKN GOVT.COLLEGE(A), CHITTOOR
DEPARTMENT OF CHEMISTRY
Attendance for Certificate Course on CHEMISTRY OF MILK"

S. No	Name of the student	Class/Group	Regd. No.	Signature of the Student				
				05.01.23	06.01.23	07.01.23	08.01.23	09.01.23
1	I. Sowmya	II B.Sc BZC	220302515	I. Sowmya	I. Sowmya	I. Sowmya	I. Sowmya	I. Sowmya
2	J. Mounika	II B.Sc BZC	220302517	J. Mounika	J. Mounika	J. Mounika	J. Mounika	J. Mounika
3	B. Prasanna	II B.Sc BZC	220302503	B. Prasanna	B. Prasanna	B. Prasanna	B. Prasanna	B. Prasanna
4	R. Yamini	II B.Sc BZC	220302537	R. Yamini	R. Yamini	R. Yamini	R. Yamini	R. Yamini
5	A. Kavya	II B.Sc BZC	220302501	A. Kavya	A. Kavya	A. Kavya	ABSENT	A. Kavya
6	V. Sneha	II B.Sc BZC	220302546	V. Sneha	V. Sneha	V. Sneha		V. Sneha
7	S. Poojitha	II B.Sc BZC	220302540	S. Poojitha	S. Poojitha	S. Poojitha	S. Poojitha	S. Poojitha
8	S. Nagaveni	II B.Sc BZC	220302539					
9	K. Thilak	II B.Sc BZC	220302520	K. Thilak		K. Thilak	K. Thilak	K. Thilak
10	G. Vijayavani	II B.Sc BZC	220302512					
11	S. Ghousiya	II B.Sc BZC	220302541	S. Ghousiya	S. Ghousiya	S. Ghousiya	S. Ghousiya	S. Ghousiya
12	S. Ummisalma	II B.Sc BZC	220302542	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma
13	M. Gunasekhari	II B.Sc BZC	220302525	M. Gunasekhari	M. Gunasekhari	M. Gunasekhari	M. Gunasekhari	M. Gunasekhari
14	P. Abubakar Siddiq	II B.Sc BZC	220302530	P. Abubakar Siddiq	P. Abubakar Siddiq	ABSENT	P. Abubakar Siddiq	P. Abubakar Siddiq
15	B. Divya	II B.Sc BZC	220302504	B. Divya	B. Divya	B. Divya	B. Divya	ABSENT
16	K. Bhavya	II B.Sc BZC	220302521	K. Bhavya	ABSENT	K. Bhavya	K. Bhavya	K. Bhavya
17	B.K. Swetha	II B.Sc BZC	220302502	B.K. Swetha	B.K. Swetha	ABSENT	B.K. Swetha	B.K. Swetha
18	C. Pavithra	II B.Sc BHC	220307504	C. Pavithra	C. Pavithra	C. Pavithra	C. Pavithra	C. Pavithra
19	G. Sai Swaroopa	II B.Sc BHC	220307508	G. Saiswaroopa	ABSENT	G. Saiswaroopa	ABSENT	G. Saiswaroopa
20	D. Sandhya	II B.Sc BHC	220307505	D. Sandhya	D. Sandhya	D. Sandhya	D. Sandhya	D. Sandhya
21	B. Nagalakshmi	II B.Sc BHC	220307501	B. Nagal	B. Nagal	ABSENT	B. Nagal	ABSENT
22	T.V. Deepthi	II B.Sc BHC	220307525	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi
23	K.S. Subhashini	II B.Sc BHC	220307516	K.S. Subhashini	K.S. Subhashini	K.S. Subhashini	K.S. Subhashini	K.S. Subhashini
24	G. Poojitha	II B.Sc BHC	220307507	G. Poojitha	G. Poojitha	G. Poojitha	G. Poojitha	G. Poojitha
25	J. Bhuvaneswari	II B.Sc BHC	220307511	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari
26	T.A. Sindhuja	II B.Sc BHC	220307524	ABSENT	T.A. Sindhuja	T.A. Sindhuja	T.A. Sindhuja	ABSENT
27	J. Vinay Kumar	II B.Sc BHC	220307513	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar
28	G. Vijay	II B.Sc BHC	220307510	G. Vijay	G. Vijay	G. Vijay	G. Vijay	G. Vijay
29	T. Reddemma	II B.Sc BHC	220307526	T. Reddemma	T. Reddemma	T. Reddemma	T. Reddemma	T. Reddemma
30	P. Sridevi	II B.Sc BHC	220307522	P. Sridevi	P. Sridevi	P. Sridevi	P. Sridevi	P. Sridevi

DEPARTMENT OF CHEMISTRY

PVKN GC(A), CHITTOOR

PVKN GOVT.COLLEGE(A), CHITTOOR
DEPARTMENT OF CHEMISTRY
Attendance for Certificate Course on CHEMISTRY OF MILK"

S. No	Name of the student	Class/Group	Regd. No.	Signature of the Student				
				19.01.23	20.01.23	21.01.23	23.01.23	24.01.23
1	I. Sowmya	II B.Sc BZC	220302515	I. Sowmya	I. Sowmya	I. Sowmya	I. Sowmya	I. Sowmya
2	J. Mounika	II B.Sc BZC	220302517	J. Mounika	J. Mounika	ABSENT	J. Mounika	J. Mounika
3	B. Prasanna	II B.Sc BZC	220302503	B. Prasanna	ABSENT	B. Prasanna	B. Prasanna	B. Prasanna
4	R. Yamini	II B.Sc BZC	220302537	R. Yamini	R. Yamini	R. Yamini	R. Yamini	R. Yamini
5	A. Kavya	II B.Sc BZC	220302501	A. Kavya	A. Kavya	A. Kavya	A. Kavya	A. Kavya
6	V. Sneha	II B.Sc BZC	220302546	V. Sneha		V. Sneha	V. Sneha	V. Sneha
7	S. Poojitha	II B.Sc BZC	220302540	S. Poojitha	S. Poojitha	S. Poojitha	S. Poojitha	S. Poojitha
8	S. Nagaveni	II B.Sc BZC	220302539	S. Nagaveni	S. Nagaveni	S. Nagaveni	S. Nagaveni	S. Nagaveni
9	K. Thilak	II B.Sc BZC	220302520	K. Thilak	K. Thilak		K. Thilak	K. Thilak
10	G. Vijayavani	II B.Sc BZC	220302512	G. Vijayavani	G. Vijayavani	G. Vijayavani	G. Vijayavani	G. Vijayavani
11	S. Ghousiya	II B.Sc BZC	220302541	S. Ghousiya	S. Ghousiya	S. Ghousiya	S. Ghousiya	S. Ghousiya
12	S. Ummisalma	II B.Sc BZC	220302542	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma	S. Ummi Salma
13	M. Gunasekhari	II B.Sc BZC	220302525	ABSENT	M. Gunasekhari	ABSENT	M. Gunasekhari	M. Gunasekhari
14	P. Abubakar Siddiq	II B.Sc BZC	220302530	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq	P. Abubakar Siddiq
15	B. Divya	II B.Sc BZC	220302504	ABSENT	B. Divya	B. Divya	ABSENT	B. Divya
16	K. Bhavya	II B.Sc BZC	220302521	K. Bhavya	K. Bhavya	K. Bhavya	K. Bhavya	K. Bhavya
17	B.K. Swetha	II B.Sc BZC	220302502	B.K. Swetha	B.K. Swetha	ABSENT	B.K. Swetha	B.K. Swetha
18	C. Pavithra	II B.Sc BHC	220307504	C. Pavithra	C. Pavithra	C. Pavithra	C. Pavithra	C. Pavithra
19	G. Sai Swaroopa	II B.Sc BHC	220307508	G. Saiswaroopa	G. Saiswaroopa	G. Saiswaroopa	G. Saiswaroopa	G. Saiswaroopa
20	D. Sandhya	II B.Sc BHC	220307505	D. Sandhya	ABSENT	D. Sandhya	D. Sandhya	D. Sandhya
21	B. Nagalakshmi	II B.Sc BHC	220307501	B. Naga	B. Naga	B. Naga	B. Naga	B. Naga
22	T.V. Deepthi	II B.Sc BHC	220307525	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi	T.V. Deepthi
23	K.S. Subhashini	II B.Sc BHC	220307516	ABSENT	K.S. Subhashini	K.S. Subhashini	K.S. Subhashini	K.S. Subhashini
24	G. Poojitha	II B.Sc BHC	220307507	G. Poojitha	G. Poojitha	G. Poojitha	G. Poojitha	G. Poojitha
25	J. Bhuvaneswari	II B.Sc BHC	220307511	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari	J. Bhuvaneswari
26	T.A. Sindhuja	II B.Sc BHC	220307524	T.A. Sindhuja	T.A. Sindhuja	T.A. Sindhuja	ABSENT	T.A. Sindhuja
27	J. Vinay Kumar	II B.Sc BHC	220307513	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar	J. Vinay Kumar
28	G. Vijay	II B.Sc BHC	220307510	G. Vijay	G. Vijay	G. Vijay	G. Vijay	G. Vijay
29	T. Reddemma	II B.Sc BHC	220307526	T. Reddemma	T. Reddemma	T. Reddemma	T. Reddemma	T. Reddemma
30	P. Sridevi	II B.Sc BHC	220307522	P. Sridevi	P. Sridevi	P. Sridevi	P. Sridevi	P. Sridevi

HANDOUT FOR CHEMSITRY OF MILK (THEORY)

List of Contents

1	**INTRODUCTION**
1.1	Importance of Milk
1.2	Milk definition and composition
1.3	Milk-Lipids, Proteins & Carbohydrates
1.4	Minerals and Vitamins in Milk
2	**DAIRY PROCESSING**
2.1	Cleaning in place (CIP) System
2.2	Dairy Technology
2.3	Concentrated and Dried milk products
2.4	Manufacture of Dahi – Yoghurt
3	**QUALITY ANALYSIS OF MILK**
3.1	Determination of Specific gravity
3.2	Determination and significance of MBR Test
3.3	Common adulterants in milk and their detection techniques

Introduction

1.1 Importance of Milk

Milk is a complex fluid containing many components in different states of dispersion. Understanding its properties and the changes that occur in it requires knowledge of all the components and their interaction with other constituents. An over view of the milk composition and their physical states of dispersion are being dealt in this lesson.

1.2 Milk Definition and composition

Milk in legal terms (PFA1954) may be defined as whole, fresh, clean, lacteal secretions, obtained by complete milking of one or more healthy milch animals, excluding that obtained 15 days before or 5 days after or such periods as may be necessary to render the milk practically colostrum free and containing legally prescribed minimum percentage of fat and Solids-not-fat (SNF).

How ever in chemical terms milk may be defined as a complex chemical substance in which fat is present in the form of an emulsion, protein and some mineral matter in the colloidal state and lactose with some minerals and soluble proteins in the form of true solution.

All species of mammals secrete milk to provide nutrients required for the optimum growth of the new born, apart from protecting it from some of the common diseases. The development of the young one in all species of mammals is not uniform as such the composition of the milk secreted by these mammals will also vary depending up on the nutritional needs of the young one. It is a matter of academic interest to know the average composition of milk from some of the species along with the composition of milk from human.

the composition of milk from various species is given for understanding the variation in the composition of the milk secreted by them. It could be observed that the buffalo milk is having the maximum fat while the fat content in sheep milk is also much close to that. Similarly, the fat percent in goat milk is much similar to cow milk. Variation among the protein percent is also very less among these species. The lactose content in Human milk is characterized by having higher percent of lactose and fat while the protein and ash content is much less when compared with other species.

1.3 Milk-Lipids, Proteins & Carbohydrates

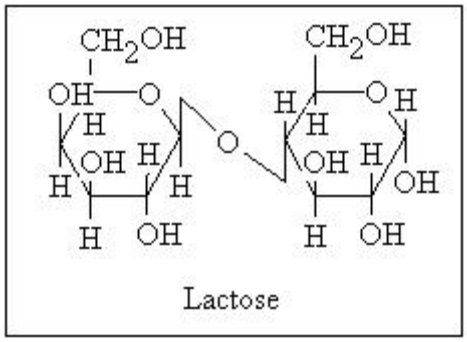
In milk, fat exists in the form of fat globules. The unique feature of these fat globules is that these fat globules are surrounded with a membrane which is derived from the apical membrane of the mammary secretory cell. Milk minus fat globules is called "Milk plasma".

Proteins:

Casein is the major protein of bovine milk and exists mainly as micellar form, where as in human milk major proteins are whey proteins. The Casein micelle consists of water, casein, salts and some minor components including lipase and proteinase. Casein micelles are built of smaller particles called sub-units or sub-micelles. Milk plasma free from casein micelles is known as milk serum. The liquid that is obtained on clotting of milk either with rennet or by acidification to pH 4.6 (isoelectric point of casein) is known as whey. This whey differs in its composition from that of serum in having some of the polypeptides cleaved from casein by the action of rennet. The proteins present in whey are termed as whey proteins of milk. The whey proteins are mainly globular proteins. Lipoprotein particles sometimes called microsomes vary in their quantity, composition, and shape. They consist remnants of cell membranes, microvilli, etc.

Carbohydrates:

Milk contains approximately 4.9% carbohydrate that is predominately lactose with trace amounts of monosaccharides and oligosaccharides. Lactose is a disaccharide of glucose and galactose. The structure of lactose is:



Lactose

1.4 Minerals and Vitamins in Milk

Vitamins in Milk

Vitamins have many roles in the body, including metabolism co-factors, oxygen transport and antioxidants. They help the body use carbohydrates, protein, and fat. The specific content of vitamins in milk is listed in the Nutrient Content Tables in the Nutrition Facts section.

Milk contains the water Soluble vitamins thiamine (vitamin B1), riboflavin (vitamin B2), niacin (vitamin B3), pantothenic acid (vitamin B5), vitamin B6 (pyridoxine), vitamin B12 (cobalamin), vitamin C, and folate. Milk is a good source of thiamine, riboflavin and vitamin B12. Milk contains small amounts of niacin, pantothenic acid, vitamin B6, vitamin C, and folate and is not considered a major source of these vitamins in the diet.

Milk contains the fat soluble vitamins A, D, E, and K. The content level of fat soluble vitamins in dairy products depends on the fat content of the product. Reduced fat (2% fat), lowfat (1% fat), and skim milk must be fortified with vitamin A to be nutritionally equivalent to whole milk. Fortification of all milk with vitamin D is voluntary. Milk contains small amounts of vitamins E and K and is not considered a major source of these vitamins in the diet.

Minerals in Milk

Minerals have many roles in the body including enzyme functions, bone formation, water balance maintenance, and oxygen transport. The specific content of minerals in milk is listed in the Nutrient Content Tables in the Nutrition Facts section.

Milk is a good source of calcium, magnesium, phosphorus, potassium, selenium, and zinc. Many minerals in milk are associated together in the form of salts, such as calcium phosphate. In milk approximately 67% of the calcium, 35% of the magnesium, and 44% of the phosphate are salts bound within the casein micelle and the remainder are soluble in the serum phase. The fact that calcium and phosphate are associated as salts bound with the protein does not affect the nutritional availability of either calcium or phosphate.

Milk contains small amounts of copper, iron, manganese, and sodium and is not considered a major source of these minerals in the diet

2.Dairy Processing

Milk processing converts liquid milk into dairy products like pasteurized liquid milk, yoghurt, butter, cheese, ghee and so on. Reasons for processing are:

- processed products attract a higher price;
- **increased keeping time** of the product;
- **more distant markets** can be accessed;
- processed products are generally **easier to transport** (lighter/less bulky);
- **increased quality and hygienic safety;**
- **more flexibility in satisfying consumer demands**, (make more or less liquid milk, more cheese, etc.);
- **it creates employment.**

Small-scale processors can produce a wide range of dairy products. In deciding which dairy products, the group is going to make, it is best to carry out a detailed market/feasibility study. Milk products can be processed as illustrated.

2.1 Cleaning in place (CIP) System

CIP systems in dairy plants and other food and hygiene-focused industries are an efficient way to thoroughly clean and sanitize the interior of processing machinery and other equipment, creating a safer production space.

Steps to CIP Procedures in the Dairy Industry:

The basic CIP process in dairy plant facilities consists of five steps:

1. Pre-rinse

Pre-rinsing is an essential part of the CIP cycle. Doing a pre-rinse will wet the interior surface of the lines and tanks, rinsing away any residue, dissolving sugars, melting fats, and testing the non-chemical pressure of the flow path.

For the pre-rinse of the CIP system in dairy facilities, you should use deionized water that has been processed through reverse osmosis. You can also reuse the water from the final rinse cycle of your last dairy CIP cleaning.

2. Caustic Wash

The next step is the caustic wash, using hot water to further soften any fats so that they are easier to remove. It involves a mix of sodium hydroxide, which has a high pH level and is generally used as the main detergent for dairy CIP cleaning cycles.

Typically, these washes can be returned to the tank and re-used a few times to reduce water, chemical, and energy usage.

3. Intermediate Rinse

During the CIP procedure, the intermediate rinse uses clean water to rinse off any remaining detergent from the previous step.

4. Final Rinse

Detergents may still be in the system, so the final rinse will help to remove any remaining residue. For this rinse, you want to use deionized reverse osmosis water or city water. In many cases, the water from the final rinse can be saved and reused in the next CIP process.

5. Sanitizing Rinse

The final official step for clean-in-place systems is the sanitization process. This step is critical for a CIP system, since it will kill any microorganisms before the next production run. In many cases, hypochlorite solutions are used for sanitizing a CIP system in dairy industry facilities.

2.2 Dairy Technology

2.3 Concentrated and Dried milk products

Concentrated milks are obtained by partial water removal to the extent they contain less than 40% milk solids. The result is a concentrated liquid. The two most common types are evaporated milk and sweetened condensed milk. Reduced-fat and nonfat versions are also available. Concentrated products are sterilized or their osmotic pressure is increased so that no microorganisms survive.

Because of its concentrated form, evaporated milk is a multipurpose, convenient dairy product ready for every milk use. Pouring directly from the can, evaporated milk can be used in countless applications: creaming coffee or tea, poured on cereals and fruits, providing consistency in meat patties and loaves, coatings for baked or fried meats, or in place of milk in the manufacture of candies, frostings, and pies.

2.4 Manufacture of Dahi – Yoghurt

Yogurt is made in a similar fashion to buttermilk and sour cream, but it requires different bacteria and temperatures. Whole, low-fat, or skim milk is fortified with non fat dry milk or fresh condensed skim milk, in order to raise the total solids to 14 to 16 percent. The mixture is heat-treated as for buttermilk and then cooled to 45.6 to 46.7 °C (114 to 116 °F). At this point a culture of equal parts *Lactobacillus bulgaricus* and *Streptococcus thermophilus* is added to the warm milk, followed by one of two processing methods.

For set, or sundae-style, yogurt (fruit on the bottom), the cultured mixture is poured into cups containing the fruit, held in a warm room until the milk coagulates (usually about four hours), and then moved to a refrigerated room. For blended (Swiss- or French-style) yogurt, the milk is allowed to incubate in large heated tanks. After coagulation occurs, the mixture is cooled, fruit or other flavours are added, and the product is placed in containers and immediately made ready for sale.

Many yogurt manufacturers have added *Lactobacillus acidophilus* to their bacterial cultures. *L. acidophilus* has possible health benefits in easing yeast infections and restoring normal bacterial balance to the intestinal tract of humans after antibiotic treatment.

3. QUALITY ANALYSIS OF MILK

3.1 Determination of Specific gravity

Chemical tests performed in order to meet the mandatory standards for legal requirements constitute testing for major components of milk and milk products namely, fat, total solids, lactose, protein, moisture, ash etc. Speed, sensitivity and accuracy are key factors for choice of the various existing methods. Rapid instrumental methods have also evolved in the recent past. Therefore, many dairies use instruments such as Milko-tester, Infra-red milk analyzer, Milko-scan, Lactostar etc.

3.2 Fat Determination

As the FSS Rules, 2011 (earlier PFA Act) prescribes the minimum level of milk fat for cow and buffalo milk in various regions of the country, it is important to determine fat content of raw milk being received at the dairy. There are two methods of determining fat content of milk namely the Gerber method, based on direct reading and Rose Gottlieb method, which is a gravimetric test. The former is more widely used as it is quicker than the gravimetric method..

The Gerber test is based on the principle that when a definite quantity of sulphuric acid and amyl alcohol are added to a definite volume of milk, the proteins dissolve and fat is set free from within the globules. This fat remains in the liquid state due to heat produced by the acid. Upon centrifugation, fat being lighter separates on top of the solution as liquid fat column in butyrometer stem.

Ten milliliters of sulphuric acid (Gerber acid) is transferred into milk butyrometer (range 0–10%) using an automatic measure. The milk sample is mixed well and 10.75 ml is slowly transferred from the side of the butyrometer wall

taking care not to wet its neck. Thereafter, one ml of amyl alcohol is added and the butyrometer closed with a lock stopper and shaken well. The contents are centrifuged for 5 min at 1100–1200 rpm and the fat that appears as a colourless column read directly on the butyrometer stem

Solids-Not-Fat (SNF) Estimation

SNF is the collective term given to the various components of milk other than fat. The SNF content of milk is calculated by determining the specific gravity of milk. Lactometers are used for rapid determination of specific gravity of liquids. The method is based on the law of floatation which states that when a solid is immersed in a liquid it is subjected to upward thrust equal to the weight of liquid displaced by it and acting vertically upwards. Lactometers are variable immersion type hydrometers and calibrated in advance with liquids of known specific gravity.

SNF testing assembly

The sample is mixed well avoiding incorporation of air or foam formation. The temperature of milk sample is adjusted to measuring temperature prescribed for the BIS lactometer (27°C). Sufficient milk is poured into the glass or steel cylinder to allow free floating of lactometer. It is then placed in the milk and allowed to float till it stops and assumes a constant level. The lactometer reading and temperature of milk are recorded at the same time. This is the lactometer reading (LR). The corrected value or corrected lactometer reading (CLR) is obtained from the standard table for corresponding temperature. The SNF and/or TS content are calculated using the given formulas.

Percent SNF = CLR/4 + (0.25*fat %) + 0.44
Percent Total solids = CLR/4 + (1.25*fat %) + 0.44

3.2 Determination and significance of MBR Test

Methylene Blue Dye Reduction Test, commonly known as MBRT test is used as a quick method to assess the microbiological quality of raw and pasteurized milk. This test is based on the fact that the blue colour of the dye solution added to the milk get decolourized when the oxygen present in the milk get exhausted due to microbial activity. The sooner the decolourization, more inferior is the bacteriological quality of milk assumed to be. This test is widely used at the dairy reception dock, processing units and milk chilling centres where it is followed as acceptance/rejection criteria for the raw and processed milk.

Grading of raw milk based on MBRT:

MBRT test may be utilized for grading of milk which may be useful for the milk processor to take a decision on further processing of milk. As per BIS 1479 (Part 3): 1977 criterion for grading of raw milk based on MBRT is as below:

5 hrs and above	Very good
3 to 4 hrs	Good
1 to 2 hrs	Fair
Less than ½ hrs	Poor

Procedure:

The test has to be done under sterile conditions. Take 10 ml milk sample in sterile MBRT test tube. Add 1 ml MBRT dye solution (dye concentration 0.005%). Stopper the tubes with sterilized rubber stopper and carefully place them in a test tube stand dipped in a serological water bath maintained at 37±1^{0}C. Record this time as the beginning of the incubation period. Decolorization is considered complete when only a faint blue ring (about 5mm) persists at the top.

Recording of Results - During incubation, observe colour changes as follows:

a) If any sample is decolourized on incubation for 30 minutes, record the reduction time as MBRT - 30 minutes.

b) Record such readings as, reduction times in whole hours. For example, if the colour disappears between 0.5 and 1.5 hour readings, record the result as MBRT - 1 hour; similarly, if between l.5 and 2.5 hours as MBRT - 2 hour and so on.

c) Immediately after each, reading, remove and record all the decolourized samples and then gently invert the remaining tubes if the decolourization has not yet begun.

3.3 Common adulterants in milk and their detection techniques

Buttermilk

Because of its name, most people assume buttermilk is high in fat. Actually, the name refers to the fact that buttermilk was once the watery end-product of butter making. Modern buttermilk is made from low-fat or skim milk and has less than 2 percent fat and sometimes none. Its correct name in many jurisdictions is "cultured low-fat milk" or "cultured nonfat milk."

The starting ingredient for buttermilk is skim or low-fat milk. The milk is pasteurized at 82 to 88 °C (180 to 190 °F) for 30 minutes, or at 90 °C (195 °F) for two to three minutes. This heating process is done to destroy all naturally occurring bacteria and to denature the protein in order to minimize wheying off (separation of liquid from solids).

The milk is then cooled to 22 °C (72 °F), and starter cultures of desirable bacteria, such as *Streptococcus lactis, S. cremoris, Leuconostoc citrovorum*, and *L. dextranicum*, are added to develop buttermilk's acidity and unique flavour. These organisms may be used singly or in combination to obtain the desired flavour.

The ripening process takes about 12 to 14 hours (overnight). At the correct stage of acid and flavour, the product is gently stirred to break the curd, and it is cooled to 7.2 °C (45 °F) in order to halt fermentation. It is then packaged and refrigerated.

Sour cream:

Sour cream is made according to the same temperature and culture methods as used for buttermilk. The main difference is the starting material—sour cream starts with light 18 percent cream.

S. No.	Food Article	Adulterant	Method of detection	Remarks
1	Milk	Water	The presence of water can be detected by putting a drop of milk on a polished slanting surface. The drop of pure milk flows slowly leaving a white trail behind it, whereas milk adulterated with water will flow immediately without leaving a mark.	
2		Starch	Add a few drops of tincture of Iodine or Iodine solution. Formation of blue colour indicates the presence of starch.	Iodine solution is easily available in the medical stores
3		Urea	Take a teaspoon of milk in a test tube. Add half teaspoon of soybean or arhar powder, Mix up the contents thoroughly by shaking the test tube. After 5 minutes, dip a red litmus paper in it. Remove the paper after half a minute. A change in colour from red to blue indicates the presence of urea in the milk.	
4		Detergent	Shake 5-10 ml of sample with an equal amount of water. Lather indicates the presence of detergent	
5		Synthetic milk	Synthetic milk has bitter after taste, gives a soapy feeling on rubbing between the fingers and turns yellowish on heating	Synthetic milk is made by adding while colour water paint, oils, alkali, urea and detergent, etc.
6		Synthetic milk - test for protein	The milk can be easily tested using Urease strips. Colour chart in Urease strips helps to arrive at the quantity of urea present in the milk.	Urease strip is a biostrip based on enzymatic assay.
7		Test for Glucose /Invert sugar	Take a strip of Diacetric strip and dip in to the milk for 30 sec to 1 min. If the strip changes the color then it shows the sample of milk contains glucose .If there is no change in the color of the strip , then glucose is absent.	Glucose inverts sugar syrup is added to the milk increases the consistency and taste.

HANDOUT FOR CHEMSITRY OF MILK (PRACTICAL)

Practical

Organoleptic test of Milk, lactometer test, Clot on boiling test, and Alcohol test to determine the overall quality of milk:

Milk testing

The methods used for milk testing are usually related to the payment system adopted. The different methods for milk testing are briefly described below, with an emphasis on simple and cost-effective methods. These focus on milk reception tests that can be carried out at collection centres. For a more detailed description of the tests and for other tests see technical books in the information sources at the end of this book.

Quality testing

Milk testing for quality can be divided into testing for hygiene and for composition. You always have to balance between the costs and benefits of the tests, because testing regularly can become very expensive! Make sure you always clean milk testing equipment thoroughly after use: you can use boiling water for at least one minute, 70% alcohol, or keep the equipment in a flame. Some examples of tests, in order of cost and simplicity are described below:

1. Taste, smell, visual observation and temperature

This should always be the first screening of the milk, since it is cheap, quick and does not require any equipment. These tests are also called 'organoleptic tests'. It is also reliable if the person carrying out the tests is experienced. The tester smells the milk, observes the appearance, tastes if necessary, checks the can for cleanliness, looks for sediment, and filters the milk to check its cleanliness. If doubts arise after the examination about the quality of the milk, other tests can be done to determine the quality.

2. Density meter or lactometer test

With a lactometer the specific density of milk is measured. At 15 degrees Celsius, the normal density of the milk ranges from 1.028 to 1.033 g/ml, whereas water has a density of 1.0 g/ml. So when you read the lactometer, you can determine whether water has been added to the milk. It is best to combine the lactometer reading with the fat test: if the results of the fat test are low and the density is high (e.g. 1.035), then the milk might have been skimmed. If the results of the fat test are low and the density is low (e.g. 1.027), then water might have been added to the milk. You can use the lactometer reading together

with the fat percentage to estimate the Solids NonFat (SNF) content of the milk (see milk payment systems, method 3).

Always read the temperature of the milk first: the lactometer reading varies according to the temperature. Make sure you adjust readings as indicated in table 3 below.

Table: Temperature adjustments for lactometer readings

Temp (°C)	17	18	19	20	21	22	23	24
Correction:	- 0.007	- 0.005	- 0.003	0.000	+0.003	+0.005	+0.008	+0.011

3. Clot-on-boiling

The clot-on-boiling test is simple, quick and cheap. If the milk is sour or if the milk is abnormal (colostrum or mastitis milk) the milk will not pass this test. Place test tubes with 5 ml of milk for up to 4 minutes in boiling water or in a flame. Examine the tubes and reject the milk if you can see the milk clotting. Please note that at high altitude milk boils at a lower temperature. This test is not very sensitive to slightly sour milk and an alternative is the alcohol test.

4. Alcohol test

If the milk is sour or if the milk is abnormal (colostrum or mastitis milk) the milk will not pass the alcohol test. You carry out the test by mixing equal amounts (2 ml) of milk and a 68% ethanol solution (made by mixing 68 ml of 96% alcohol with 28 ml distilled water). Milk that contains more than 0.21% acid will coagulate when alcohol is added.

5. Acidity test

This test measures the lactic acid in the milk. If the acidity is higher than 0.19%, then the milk quality is poor and cannot be processed. If the acidity is lower than normal (e.g. 0.10% lactic acid) then the milk is of poor bacterial quality or sodium hydroxide/bicarbonate might have been added. For this test you will need a white porcelain dish, a 10 ml pipette, a 1 ml pipette, a burette (0.1 ml graduations), a glass rod for stirring, a phenophtalein indicator solution (0.5% in 50% alcohol) and a 0.1 N Sodium Hydroxide solution. Measure 9 ml of the milk into the dish, add 1 ml of phenophtalein and from the burette, slowly add the 0.1 N sodium hydroxide solution while mixing continuously, until a faint pink colour appears. The more Sodium Hydroxide you have to add before it turns pink, the more acid the milk.

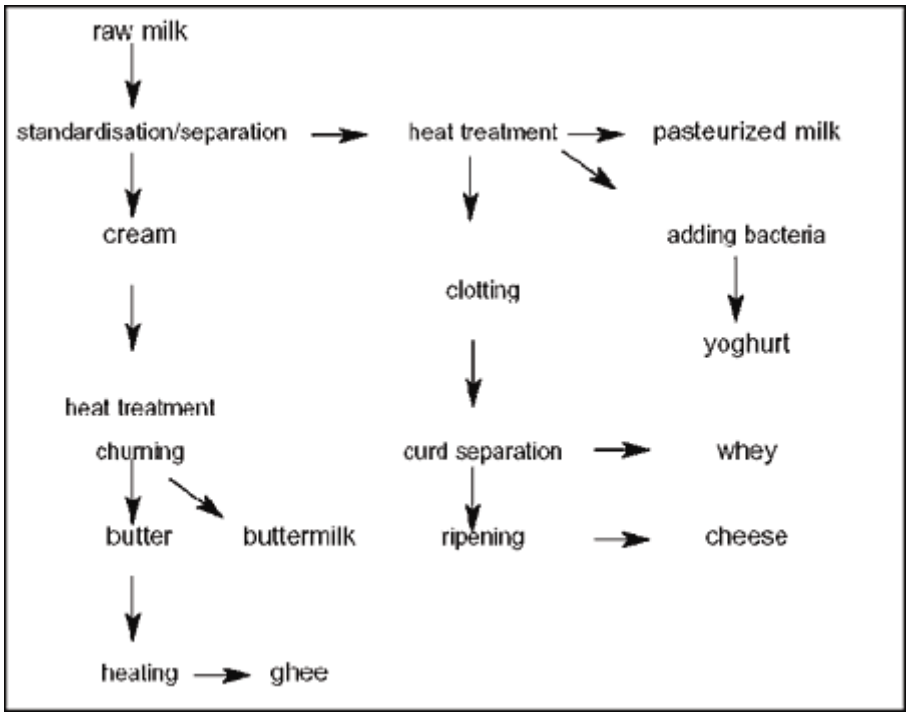
6. Gerber test for fat

This test is used to determine the fat content of the milk. 10.94 ml. of milk at 20 degrees Celsius is added to a butyrometer together with sulphuric acid and amyl alcohol. After centrifugation, the sample is put in a 65 degrees Celsius water bath and read after 3 minutes. The fat content from this reading should not be less than 3%.

Pasteurization Process:

Pasteurization is the most commonly used heat treatment for milk. Before processing, the milk should preferably be tested for bacterial quality. You then filter the milk to remove particles. Pasteurization is the process of heating milk just enough to kill harmful micro-organisms without destroying flavour and nutritional qualities. Milk is heated to either 63-65°C for 20-30 minutes or 72-75°C for 15-30 seconds. The simplest equipment required is an open boiling pan over a fire. A steam jacketed pan (or pressure cooker) would improve the heating process and can be fitted with a stirrer to improve the efficiency of heating. Pasteurized milk has a shelf life of 2-3 days, and up to 12 days if kept at 4°C.

milk processing options



PVKN GOVT. COLLEGE (A), CHITTOOR

DEPARTMENT OF CHEMISTRY

"Chemistry of Milk"

Add-on Course Theory Examination: 25-01-2023

Regd. Number of Student: **Class :**

Time: 15 Minutes **Max. Marks: 20**

1. Which of the following does not accelerate the rate of oxidation of fat?

a) Presence of iron and copper salts b) Presence of dissolved oxygen

c) Exposure to light d) Presence of water

2. _____ is the principal contributor to sunlight flavor.

a) Methional b) Ethane

c) Heptane d) Acid

3. Enzyme responsible for Lipolysis is _____

a) Pepsin b) Pectinase

c) Lipases d) Rennin

4. The purpose of heat treatment on milk is _____

a) Kill pathogenic microorganism b) Heat milk

c) Evaporation d) Taste enhancement

5. _____ is recommended in order to avoid cream plug formation.

a) Cooling b) Freezing

c) Churning d) Homogenization

6. Most Heat sensitive vitamin in milk is?

a) Vitamin A b) Vitamin B

c) Vitamin C d) Vitamin D

7. Heat treatment on minerals results leads to _____

a) Clumps formation b) Bubble formation

c) Foul smell d) Loss of cheese making characteristics

8. Opacity in milk is due to which of the following reasons?

a) White color b) Heat treatment

c) Additives d) Suspended particles of fat

9. Yellowish tinge in milk can be attributed to which of the following?

a) Carotene b) Water

c) Riboflavin d) Metalin

10. In an equation Fat%, SNF% and water determine 'd'. The 'd' in this expression is?

a) Viscosity b) Friction force

c) Density d) Acceleration

PVKN GOVT. COLLEGE (A), CHITTOOR

DEPARTMENT OF CHEMISTRY

"Chemistry of Milk"

Add-on Course Practical Examination: 25-01-2023

Regd. Number of Student: **Class :**

Time: 2 Hour **Max. Marks: 30**

Answer all the questions. Each question carries 10 marks **10X3 =30 Marks**

1. Determination of acidity of given sample of milk by titration method
2. Detect of adulterants in the given milk and milk products.
3. Use Alcohol test to determine the overall quality of milk.

TEST ANALYSIS REPORT

THEORY & PRACTICAL EXAM MARKS

S.No	Name of the student	Hall Ticket No	Program / Group	Theory (20M)	Practical (30M)	Total (50)
1	I. Sowmya	220302515	II B.Sc-BZC-EM	18	25	43
2	J. Mounika	220302517	II B.Sc-BZC-EM	14	27	41
3	B. Prasanna	220302503	II B.Sc-BZC-EM	16	28	44
4	R. Yamini	220302537	II B.Sc-BZC-EM	17	24	41
5	A. Kavya	220302501	II B.Sc-BZC-EM	15	26	43
6	V. Sneha	220302546	II B.Sc-BZC-EM	18	28	46
7	S. Poojitha	220302540	II B.Sc-BZC-EM	19	25	44
8	S. Nagaveni	220302539	II B.Sc-BZC-EM	19	24	43
9	K. Thilak	220302520	II B.Sc-BZC-EM	18	29	47
10	G. Vijayvani	220302512	II B.Sc-BZC-EM	15	27	42
11	S. Ghousiya	220302541	II B.Sc-BZC-EM	14	25	39
12	S. Ummisalma	220302542	II B.Sc-BZC-EM	19	24	43
13	V. SuryaChandra	220302547	II B.Sc-BZC-EM	17	27	44
14	C. Srikanya	220302506	II B.Sc-BZC-EM	15	26	41
15	B.K Swetha	220302502	II B.Sc-BZC-EM	16	24	40
16	C. Pavithra	220307504	II B.Sc BHC-EM	14	28	42
17	G. Sai Swaroopa	220307508	II B.Sc BHC-EM	18	25	43
18	D. Sandhya	220307505	II B.Sc BHC-EM	17	24	41
19	B. Nagalakshmi	220307501	II B.Sc BHC-EM	18	28	46
20	T.V. Deepthi	220307525	II B.Sc BHC-EM	16	27	43
21	K.S. Subhashini	220307516	II B.Sc BHC-EM	18	25	43
22	G. Poojitha	220307507	II B.Sc BHC-EM	18	26	44
23	J. Bhuvaneswari	220307511	II B.Sc BHC-EM	17	27	44
24	T.A. Sindhuja	220307524	II B.Sc BHC-EM	15	25	40
25	J. Vinay Kumar	220307513	II B.Sc BHC-EM	16	28	44
26	G. Vijay	220307510	II B.Sc BHC-EM	17	24	41
27	T. Reddemma	220307526	II B.Sc BHC-EM	18	26	44
28	P. Sridevi	220307522	II B.Sc BHC-EM	15	27	41
29	KS Bharathi	220307515	II B.Sc BHC-EM	18	28	46
30	P. Satish Kumar	220307527	II B.Sc BHC-EM	18	24	42

CRITICAL ANALYSIS REPORT:

- **The Department of Chemistry has conducted an add-on course on "Chemistry of Milk" from 12-12-2022 to 24-01-2023 with a minimum duration of 30 hours.**
- **30 students were registered for this course and all the students completed the add-on course. Certificates are provided to all the successful candidates.**
- **30 students given feedback that course content met their expectations.**
- **The objective of the course was fulfilled by acquiring of skills required in drawing molecular structures of chemical compounds.**

OUTCOMES OF THE COURSE:

- **Students understand the chemical composition of milk, including proteins, fats, carbohydrates, vitamins, and minerals.**
- **They understand the processes involved in milk pasteurization and homogenization.**
- **Students comprehend the methods used for assessing the quality and safety of milk.**
- **Understand the impact of various processing techniques on milk quality.**
- **Students explore the adulterants present in the milk and its testing methods.**
- **It creates research interest among the students.**

CONCLUSION:

The certificate course on the Chemistry of Milk provides students with a comprehensive understanding of the chemical composition of milk, milk processing, methods for assessing milk quality, chemical and physical tests for milk. The certificate course on the Chemistry of Milk provides a detailed insight into the scientific aspects of milk, making it valuable for those who choose a career in the dairy industry. With a focus on both theoretical knowledge and practical applications, this course equips participants with the skills needed to test the quality of milk and its products.

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that M GUNASEKHARI of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that SHAIK UMMI SALMA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that K BHAVYA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that B.DIVYA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that G SAI SWAROOPA of B.Sc Program II BHC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

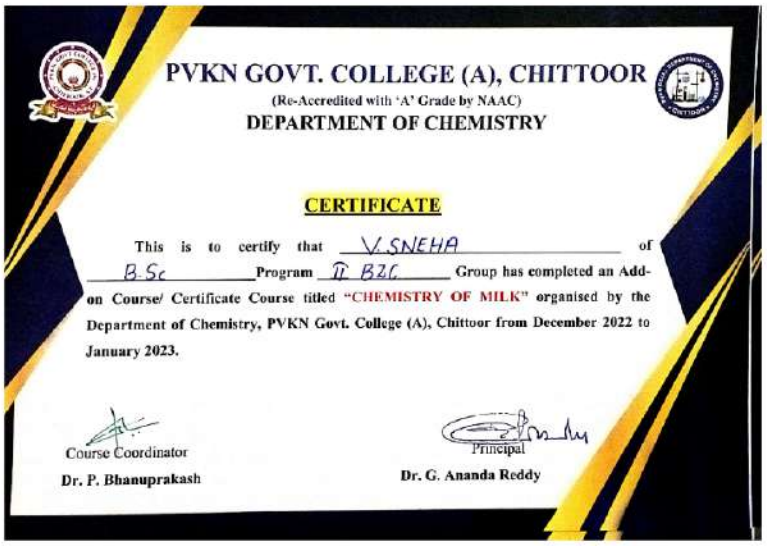
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that C.PAVITHRA of B.Sc Program II BHC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy



PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that V. SNEHA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that K. THILAK of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that S. NAGAVENI of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that SHAIK GHOUSIYA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that G. Vijaya vani of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that P. ABUBAKAR SIDDIQ of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that I. SOWMYA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that B. PRASANNA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that J. MOUNIKA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that A. KAVYA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that B. YAMINI of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR

(Re-Accredited with 'A' Grade by NAAC)

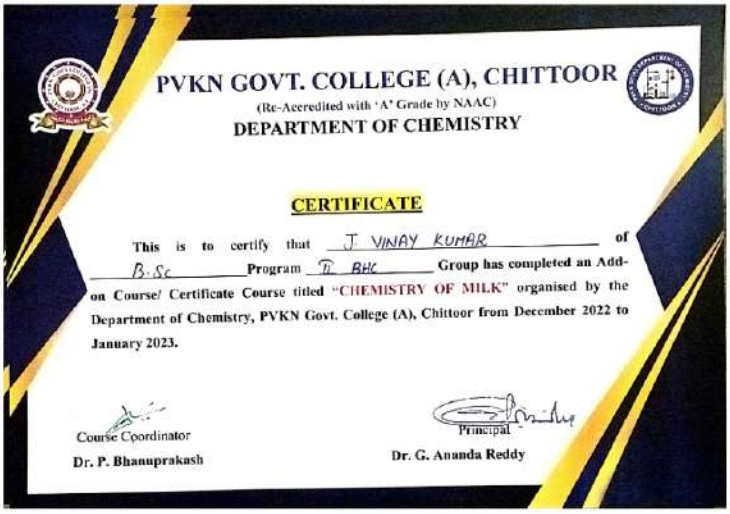
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that S. POOJITHA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy



PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that J. VINAY KUMAR of B.Sc Program II BHC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that T.A. SINDHUJA of B.Sc Program II BHC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that J. BHUVANESWARI of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that T. REDDEMMA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that G. VIJAY of B.Sc Program II BHC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that P. SRIDEVI of B.Sc Program II BHC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that B.K SWETHA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that T V DEEPTHI of B.Sc Program II BHC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that B NAGALAKSHMI of B.Sc Program II BHC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that G DOOJITHA of B.Sc Program II BZC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that K.S. SUBHASHINI of B.Sc Program II BHC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy

PVKN GOVT. COLLEGE (A), CHITTOOR
(Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF CHEMISTRY

CERTIFICATE

This is to certify that D. SANDHYA of B.Sc Program II BHC Group has completed an Add-on Course/ Certificate Course titled "CHEMISTRY OF MILK" organised by the Department of Chemistry, PVKN Govt. College (A), Chittoor from December 2022 to January 2023.

Course Coordinator
Dr. P. Bhanuprakash

Principal
Dr. G. Ananda Reddy