MCQ 50 marks

1. **B.** 120 g
Explanation: Reaction: $C_2H_5OH + O_2 \rightarrow CH_3COOH + H_2O$
Here, the molar mass of C_2H_5OH is 46 $gmol^{-1}$
and, the molar mass of CH_3COOH is 60 $gmol^{-1}$
Again, 92 g of ethanol = $\frac{92}{46}$ = 2 mol
So, 2 mol of ethanol gives 2 mol of acetic acid
Therefore, acetic acid = 2 × 60 = 120 g

2. **D.** 11.67%
Explanation: Urea NH_2CONH_2 (M = 60):
N% = $\frac{28}{60} \times 100 = 46.67\%$
Ammonium nitrate NH_4NO_3 (M = 80):
N% = $\frac{28}{80} \times 100 = 35\%$
So, the difference = 46.67 − 35 = 11.67%

3. **C. i and iii**
Explanation: BMR increases during fever and in cold weather.

4. **C. K and D**
Explanation: Phylloquinone is the chemical name of vitamin K and calciferol is the chemical name of vitamin D.

5. **B. i and ii**
Explanation: CaC_2 (used to ripen fruits) and formalin (40% aqueous solution of HCHO) are prohibited in food preservation.
Therefore, i and ii are correct.

6. **C. In the presence of water at** 30°C **to** 45°C
Explanation: Bacterial growth is most accelerated in the presence of water at a temperature of 30°C to 45°C.

7. **A. amount of water in the food ÷ amount of water vapour around the food**
Explanation: At a given temperature, water activity a_w = amount of water in the food ÷ amount of water vapour around the food.
The value of a_w lies between 0 and 1.

8. **B.** 0°C **to** 4°C
Explanation: The temperature for cooling food in an ordinary refrigerator is 0°C to 4°C.

9. **D. Pasteurization**
Explanation: There are three determinants of food preservation methods: de-aeration, drying and freezing.
Pasteurization is not one of them.

10. **C. It acts as an antioxidant**
Explanation: Turmeric acts as an antioxidant and inhibits the spoilage of food.

11. **C. Apple**
Explanation: Apples have a natural wax coating that prevents the entry of microorganisms.
This coating may be lost by washing.

12. **B. Boiled raw fruit**
Explanation: Preserving boiled raw fruit in a mixture of edible mustard oil, vinegar, chilli and spices is called pickling.

13. **B.** 1000 ppm
Explanation: Maximum permitted level = 0.1%
That is, 0.1 g in 100 g of food, which equals 1 g = 1000 mg in 1000 g of food
So, the level = 1000 ppm

14. **A.** 32.7%
Explanation: $[H^+] = 10^{-5.2} = 6.31 \times 10^{-6}$ $molL^{-1}$
$\frac{[A^-]}{[HA]} = \frac{K_a}{[H^+]} = \frac{1.3\times10^{-5}}{6.31\times10^{-6}} = 2.06$
Undissociated fraction = $\frac{1}{1+2.06} = 0.327$
So, undissociated propanoic acid = 32.7%

15. **D. nitrosoamine**
Explanation: Oxidising nitrite salts react with meat proteins to form nitrosoamines.
Nitrosoamines can cause cancer.

16. **B.** 3
Explanation: Sorbic acid: $CH_3 - CH = CH - CH = CH - COOH$
It has 2 C = C bonds and 1 C = O bond, and

each double bond contains 1 π bond.
So, total π bonds = 3

17. **C. Paraben**
Explanation: Drowsiness, headache and a risk of breast cancer can occur as side effects of parabens.

18. **D.** $KHSO_3$ **and** SO_2
Explanation: Potassium bisulphite ($KHSO_3$) and SO_2 are used to preserve wine, juice and dried fruits.

19. **C. Citric > Benzoic > Ethanoic > Propanoic**
Explanation: The greater the K_a, the greater the acidity.
K_{a1} of citric acid = 7.4×10^{-4}, K_a of benzoic acid = 6.3×10^{-5}, K_a of ethanoic acid = 1.8×10^{-5} and K_a of propanoic acid = 1.3×10^{-5}
So, the order of acidity is Citric > Benzoic > Ethanoic > Propanoic.

20. **B. Vitamin E**
Explanation: Vitamin E absorbs the O_2 present in food and prevents oxidation, so it is an oxygen-absorbing antioxidant.

21. **C. It is BHT; it absorbs free radicals and prevents oxidation of fat**
Explanation: The compound has $-C(CH_3)_3$ at both ortho positions of $-OH$ and $-CH_3$ at the para position, so it is BHT.
BHT absorbs free radicals and prevents the oxidation of fat.

22. **C.** 166
Explanation: TBHQ: $C_6H_3(OH)_2 - C(CH_3)_3 = C_{10}H_{14}O_2$
Molecular mass = $10 \times 12 + 14 \times 1 + 2 \times 16 = 166$

23. **B.** $L^{\cdot} + HOO^{\cdot}$
Explanation: A lipid radical is formed in the first step.
$L - H + O_2 \rightarrow L^{\cdot} + HOO^{\cdot}$

24. **A.** $L - H$ **and stable** $A^{\cdot}$
Explanation: $A - H + L^{\cdot} \rightarrow L - H + A^{\cdot}$
Here $A^{\cdot}$ is a stable radical, so the chain reaction stops.

25. **D.** 10
Explanation: EDTA: $(HOOCCH_2)_2N - CH_2 - CH_2 - N(CH_2COOH)_2$
The four $-CH_2COOH$ groups contain 8 C atoms and $-CH_2 - CH_2-$ contains 2 C atoms.
So, total C = 10

26. **D.** $\frac{1}{2}$ **inch to** $\frac{1}{4}$ **inch**
Explanation: In the first stage of canning, fish and meat are cut into pieces of $\frac{1}{2}$ inch to $\frac{1}{4}$ inch.

27. **B. By binding metal ions through coordinate bonds and deactivating them**
Explanation: A chelating agent binds the transition metal ions that catalyse oxidation of oils and fats through coordinate bonds and deactivates them.
As a result, oxidation and spoilage are prevented.

28. **D. exhausting**
Explanation: The process of removing the air (O_2) from inside a can by heating is called exhausting.

29. **D. Guava**
Explanation: For guava, the canning liquid needs about 10% sugar, which is lower than for the other fruits (30% to 40%).

30. **B.** 2.37
Explanation: 6% (W/V) means 6 g of solute in 100 mL of solution, so the concentration = $60\ gL^{-1}$
Molar mass of $CH_3COOH = 60\ gmol^{-1}$, so $C = \frac{60}{60} = 1\ molL^{-1}$
$[H^+] = \sqrt{K_a \times C} = \sqrt{1.8 \times 10^{-5} \times 1} = 4.24 \times 10^{-3}\ molL^{-1}$
So, $pH = -\log(4.24 \times 10^{-3}) = 2.37$

31. **C.** 2 mol **glucose; maltase**
Explanation: Maltose is hydrolysed in the presence of the enzyme maltase.
$C_{12}H_{22}O_{11} + H_2O \rightarrow 2C_6H_{12}O_6$
So, 1 mol of maltose gives 2 mol of glucose.

32. **A.** 5
Explanation: $(NH_4)_2SO_4$ and $(NH_4)_3PO_4$ are added for the growth of yeast.
Number of N atoms = 2 + 3 = 5

33. **A.** 240

Explanation: $C_{12}H_{22}O_{11} + H_2O \rightarrow C_6H_{12}O_6 + C_6H_{12}O_6$
$2C_6H_{12}O_6 \rightarrow 4C_2H_5OH + 4CO_2$
$4C_2H_5OH + 4O_2 \rightarrow 4CH_3COOH + 4H_2O$
342 g (1 mol) of sucrose gives 4 mol of ethanoic acid.
So, mass = $4 \times 60 = 240$ g

34. **A. Butter**
Explanation: Butter is a gel (a liquid dispersed in a solid medium), not an emulsion.

35. **D.** $[Fe(CN)_6]^{3-}$
Explanation: For a positive sol, ions of opposite charge (anions) are effective, and the higher the charge, the greater the coagulating power.
So, the most effective ion is $[Fe(CN)_6]^{3-}$.

36. **C. Cholera vaccine**
Explanation: Cholera vaccine is an example of a suspension.

37. **C. Sodium lauryl sulphate — foaming agent**
Explanation: Sodium lauryl sulphate is a surfactant that produces foam in toothpaste.

38. **A.** $Ca(OCl)_2$
Explanation: Calcium hypochlorite, $Ca(OCl)_2$, is used in toilet cleaner as a bleaching agent, disinfectant and stain remover.

39. **D.** 34.7%
Explanation: $2C + O_2 \rightarrow 2CO$
$O_2 = 100 \times 0.21 = 21$ L, so CO = $2 \times 21 = 42$ L
N_2 remains unchanged = 79 L
Total gas = $42 + 79 = 121$ L
So, CO% = $\frac{42}{121} \times 100 = 34.7\%$

40. **B.** 470.4
Explanation: Moisture- and ash-free portion = $100 - 12.3 - 14.2 = 73.5\%$
(Volatile matter is part of this portion, so it is not subtracted.)
So, amount = $640 \times \frac{73.5}{100} = 470.4$ million metric tons

41. **B.** NH_2COONH_4**;** 180°C**,** 130 atm
Explanation: $2NH_3 + CO_2 \rightarrow NH_2COONH_4$ (180°C, 130 atm)
Urea is later formed from the intermediate ammonium carbamate: $NH_2COONH_4 \rightarrow NH_2CONH_2 + H_2O$

42. **A.** 112
Explanation: $Na_2CO_3 + CaCO_3 + 6SiO_2 \rightarrow Na_2O \cdot CaO \cdot 6SiO_2 + 2CO_2$
Moles of $SiO_2 = \frac{900000}{60} = 15000$ mol
6 mol of SiO_2 gives 2 mol of CO_2, so $CO_2 = 15000 \times \frac{2}{6} = 5000$ mol
Volume = $5000 \times 22.4 = 112000$ L = 112 m^3

43. **A. Its low thermal expansion keeps it from cracking**
Explanation: Borosilicate glass contains B_2O_3, so its coefficient of thermal expansion is very low.
Therefore, it does not crack even when heated or cooled suddenly.

44. **D.** 1 : 1
Explanation: The formula of kaolin is $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$.
It has Al = 2 and Si = 2 atoms, so the ratio = 1 : 1.

45. **A.** $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$
Explanation: $Fe_2O_3 + 4CaO + Al_2O_3 \rightarrow 4CaO \cdot Al_2O_3 \cdot Fe_2O_3$

46. **B.** $Ca(OH)_2$ **and** Na_2S**; removal of hair**
Explanation: In liming, the hide is soaked in a solution of milk of lime, $Ca(OH)_2$, and Na_2S.
This removes the hair and epidermis from the hide.

47. **D. It decreases, because** H^+ **is produced**
Explanation: H^+ is produced in the reaction, so $[H^+]$ increases.
When $[H^+]$ increases, the pH decreases.
For this reason, $NaHCO_3$ is added to keep the pH at 4.0 to 4.3.

48. **A.** $Cr(OH)_3$
Explanation: By biotechnology, the harmful $Cr_2O_7^{2-}$ is converted into $Cr(OH)_3$, which is not a pollutant.

49. **A. Biotechnology**

Explanation: In the biotechnology stage, biodegradable organic compounds are decomposed by microorganisms.
As a result, BOD decreases.

50. **A. At the cathode as metal**
Explanation: Metal cations are reduced at the cathode: $M^{n+} + ne^- \rightarrow M$
So the metal is deposited at the cathode.