Engineering Daily 20 [Set 04] EV

Industrial Chemistry + Economic Chemistry

Total Marks: 50 **Negative Marks:** 0.25 **Time:** 1 Hour

MCQ 50 marks

1. How many grams of the main component of vinegar can be obtained from 92 g of ethanol?

(A) 60 g (B) 120 g (C) 92 g (D) 180 g

2. What is the difference between the percentages of nitrogen in urea and ammonium nitrate fertilizers?

(A) 14.67% (B) 21.21%
(C) 25.12% (D) 11.67%

3. BMR increases—
i. during fever
ii. with increasing age
iii. in cold weather
Which one is correct?

(A) i, ii and iii (B) i and ii
(C) i and iii (D) ii and iii

4. Phylloquinone and calciferol are the chemical names of which vitamins respectively?

(A) D and K (B) K and A
(C) K and D (D) E and D

5. Prohibited in food preservation—
i. CaC_2
ii. 40% aqueous solution of $HCHO$
iii. C_6H_5COONa
Which one is correct?

(A) ii and iii (B) i and ii
(C) i, ii and iii (D) i and iii

6. Under which condition is bacterial growth in food most accelerated?

(A) In the presence of water at 0°C to 4°C
(B) In dry condition at 30°C to 45°C
(C) In the presence of water at 30°C to 45°C
(D) In an acidic environment of pH 3 to 4

7. Water activity (a_w) is expressed as—

(A) amount of water in the food ÷ amount of water vapour around the food
(B) amount of water in the food ÷ total mass of the food
(C) amount of water vapour around the food ÷ amount of water in the food
(D) amount of water in the food − amount of water vapour around the food

8. At what temperature is food stored by cooling in an ordinary refrigerator?

(A) 10°C to 15°C (B) 0°C to 4°C
(C) −18°C to −25°C (D) −5°C to −10°C

9. Which one is not a determinant of food preservation methods?

(A) De-aeration (B) Freezing
(C) Drying (D) Pasteurization

10. How does turmeric work as a natural food preservative?

(A) It absorbs water by osmosis
(B) It forms chelates with metal ions
(C) It acts as an antioxidant
(D) It raises the pH of the food

11. Which fruit naturally has a wax coating that may be lost by washing?

(A) Guava (B) Mango
(C) Apple (D) Banana

12. What is mainly preserved by the pickling process?

(A) Pasteurized milk (B) Boiled raw fruit
(C) Frozen meat (D) Dried fish

13. What is the maximum permitted level of sodium benzoate in food expressed in ppm?

(A) 350 ppm (B) 1000 ppm
(C) 100 ppm (D) 120 ppm

14. A bread containing calcium propanoate has pH = 5.2 . What percentage of the total propanoate remains as undissociated propanoic acid? [K_a of propanoic acid = 1.3×10^{-5}]

(A) 32.7% (B) 67.3% (C) 48.6% (D) 20.6%

15. Excess use of nitrite salts in meat increases the risk of cancer, because it reacts with meat proteins to produce—

(A) nitrobenzene (B) nitric oxide
(C) ammonia (D) nitrosoamine

16. How many π bonds are there in one molecule of sorbic acid used in food preservation?

(A) 4 (B) 3 (C) 1 (D) 2

17. Drowsiness, headache and risk of breast cancer are notable side effects of which preservative?

(A) Benzoate salt (B) Citric acid
(C) Paraben (D) Calcium propanoate

18. Used to preserve wine, juice and dried fruits—

(A) BHA and BHT
(B) $NaNO_2$ and $NaNO_3$
(C) CH_3COOH and $NaCl$
(D) $KHSO_3$ and SO_2

19. Which is the correct order of acidity of the following preservative acids?

(A) Citric > Ethanoic > Benzoic > Propanoic

(B) Ethanoic > Propanoic > Benzoic > Citric

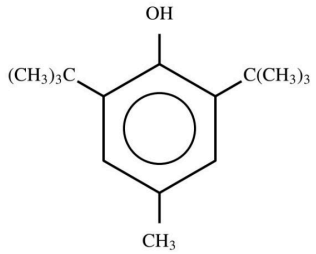
(C) Citric > Benzoic > Ethanoic > Propanoic

(D) Benzoic > Citric > Ethanoic > Propanoic

20. Which of the following is an oxygen-absorbing antioxidant?

(A) BHA (B) Vitamin E

(C) Propyl gallate (D) TBHQ



21. Which one is correct for the compound shown in the figure?

(A) It is BHT; it destroys the cells of microorganisms

(B) It is BHA; it absorbs oxygen and prevents oxidation

(C) It is BHT; it absorbs free radicals and prevents oxidation of fat

(D) It is TBHQ; it forms chelates with metal ions

22. What is the molecular mass of tertiary butyl hydroquinone (TBHQ)?

(A) 220 (B) 212 (C) 166 (D) 180

23. What is produced in the first step of the reaction between a lipid molecule and O_2 in the oxidation of fatty food?

(A) $LOOH + L^{\cdot}$ (B) $L^{\cdot} + HOO^{\cdot}$

(C) $L - O - L + H_2O$ (D) $LOO^{\cdot} + H^{\cdot}$

24. An antioxidant ($A - H$) reacts with a lipid radical ($L^{\cdot}$) to produce—

(A) $L - H$ and stable $A^{\cdot}$ (B) $L - L$ and $A - H$

(C) $LOOH$ and $A - H$ (D) $L - A$ and $H^{\cdot}$

25. How many carbon atoms are present in one molecule of EDTA?

(A) 8 (B) 12 (C) 6 (D) 10

26. In the first stage of canning, into what size are fish and meat cut?

(A) 1 inch to 2 inches (B) $\frac{1}{8}$ inch to $\frac{1}{16}$ inch

(C) 1 cm to 2 cm (D) $\frac{1}{2}$ inch to $\frac{1}{4}$ inch

27. How does a chelating agent prevent food spoilage?

(A) By donating H to free radicals and stabilising them

(B) By binding metal ions through coordinate bonds and deactivating them

(C) By destroying the cell walls of microorganisms

(D) By reducing the water activity of food to zero

28. The process of removing air from inside a can filled with food and canning liquid by heating is called—

(A) sealing (B) blanching

(C) retorting (D) exhausting

29. For which fruit is the lowest concentration of sugar needed in the canning liquid?

(A) Pineapple (B) Jackfruit

(C) Mango (D) Guava

30. A vinegar contains 6% (W/V) ethanoic acid. What is the pH of the vinegar? [K_a of ethanoic acid = 1.8×10^{-5}]

(A) 2.87 (B) 2.37 (C) 1.22 (D) 4.74

31. In the first step of malt vinegar preparation, the products of hydrolysis of 1 mol of maltose and the enzyme used are respectively—

(A) 1 mol glucose + 1 mol fructose; maltase

(B) 2 mol glucose; invertase

(C) 2 mol glucose; maltase

(D) 1 mol glucose + 1 mol fructose; invertase

32. How many N atoms are there in total in one molecule each of the two salts added for the growth of yeast in vinegar preparation?

(A) 5 (B) 4 (C) 6 (D) 3

33. If all the steps of vinegar preparation from 342 g of sucrose are completed, what is the maximum mass (in grams) of ethanoic acid that can be obtained?

(A) 240 (B) 180 (C) 120 (D) 60

34. Which of the following is not an emulsion?

(A) Butter (B) Oil in water

(C) Milk (D) Shampoo

35. Which ion is the most effective in coagulating a positively charged $Fe(OH)_3$ sol?

(A) SO_4^{2-} (B) Cl^-

(C) Al^{3+} (D) $[Fe(CN)_6]^{3-}$

36. Which of the following is an example of a suspension?

(A) Milk (B) Sugar solution

(C) Cholera vaccine (D) Fog

37. Which pair of toothpaste ingredient and its function is correct?

(A) Dicalcium phosphate — sweetener

(B) Glycerine — abrasive

(C) Sodium lauryl sulphate — foaming agent

(D) Saccharin — moisture retainer

38. Which is the formula of the ingredient used as a bleaching agent and disinfectant in toilet cleaner?

(A) $Ca(OCl)_2$ (B) $NaOH$

(C) $C_{12}H_{25}SO_4Na$ (D) NH_4OH

39. Producer gas is made by passing 100 L of air (79% N_2 and 21% O_2 by volume) at STP over red-hot coke. What is the percentage of CO by volume in the gas mixture produced?

(A) 53.2% (B) 42.0% (C) 21.0% (D) 34.7%

40. A coal mine has 640 million metric tons of coal containing 38.5% volatile matter, 14.2% ash and 12.3% moisture. What is the amount of moisture- and ash-free coal in the mine (in million metric tons)?

(A) 561.28 (B) 470.4

(C) 224.0 (D) 549.12

41. Which is the intermediate compound formed in the reaction of NH_3 and CO_2 in urea production, and what is the required condition?

(A) NH_4HCO_3; 180°C, 130 atm

(B) NH_2COONH_4; 180°C, 130 atm

(C) NH_2COONH_4; 450°C, 200 atm

(D) $(NH_4)_2CO_3$; 25°C, 1 atm

42. If 900 kg of sand reacts completely in making soda-lime glass ($Na_2O \cdot CaO \cdot 6SiO_2$), how many m^3 of CO_2 will be released at STP?

(A) 112 (B) 224 (C) 220 (D) 56

43. What is the main reason that Pyrex (borosilicate) glass is widely used in kitchens and laboratories?

(A) Its low thermal expansion keeps it from cracking

(B) It is coloured due to the presence of CoO

(C) It does not react with HF

(D) It is completely opaque

44. What is the ratio of the number of Al and Si atoms in china clay (kaolin)?

(A) 1 : 2 (B) 3 : 2 (C) 2 : 1 (D) 1 : 1

45. Which is the formula of tetracalcium aluminoferrite in Portland cement?

(A) $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$

(B) $2CaO \cdot Al_2O_3 \cdot Fe_2O_3$

(C) $3CaO \cdot Al_2O_3$

(D) $4CaO \cdot Fe_2O_3$

46. Which are the substances used in the liming process in the leather industry, and what is its main purpose?

(A) $Cr_2(SO_4)_3$ and $NaHCO_3$; tanning

(B) $Ca(OH)_2$ and Na_2S; removal of hair

(C) H_2SO_4 and $NaCl$; softening the hide

(D) $Ca(OCl)_2$; bleaching

47. What change occurs in the pH of the solution due to the reaction $2[Cr(H_2O)_6]^{3+} \rightleftharpoons Cr_2O_3 + 9H_2O + 6H^+$ in chrome tanning?

(A) It remains unchanged

(B) It increases, because Cr_2O_3 is basic

(C) It increases, because H_2O is produced

(D) It decreases, because H^+ is produced

48. Into which harmless form is the harmful $Cr_2O_7^{2-}$ converted by biotechnology?

(A) $Cr(OH)_3$ (B) CrO_4^{2-}

(C) CrO_2Cl_2 (D) CrO_3

49. In which stage of an effluent treatment plant (ETP) are organic pollutants decomposed by microorganisms, reducing BOD?

(A) Biotechnology (B) Filtration

(C) Coagulation (D) Electrolysis

50. During removal of metal ions from waste water by electrolysis, where are the ions deposited?

(A) At the cathode as metal

(B) At the anode as oxide

(C) In the solution as hydroxide

(D) At the anode as metal