Engineering Daily 20 [Set 03] EV

Industrial Chemistry + Economic Chemistry

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

MCQ 50 marks

1. How many atoms in total are present in one molecule of di-ammonium phosphate (DAP) fertilizer?

(A) 18 (B) 16 (C) 13 (D) 15

2. Responsible for food spoilage—
i. enzymes present in food
ii. Cu^{2+}, Fe^{3+} ions present in food
iii. storing food below 4°C
Which one is correct?

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

3. Case-hardening is not applicable to which one?

(A) Date (B) Raisin
(C) Dried fish (D) Pickle

4. In deep freezing, in which temperature range does bacterial cytoplasm freeze and become completely inactive?

(A) 4°C to 10°C (B) 30°C to 45°C
(C) 0°C to 4°C (D) −5°C to −10°C

5. By which process does concentrated sugar syrup (60% to 70%) destroy bacteria in food?

(A) Oxidation (B) Hydrolysis
(C) Diffusion (D) Osmosis

6. Which pair of food/agricultural product and the substance used to preserve it is not correct?

(A) Hilsa fish → NaCl (B) Jelly → sugar
(C) Pickle → vinegar (D) Soft drink → γ-rays

7. What is the basicity of the acid used in leather pickling?

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

8. Which of the following is not an antimicrobial agent?

(A) Ethyl formate (B) Propyl gallate
(C) Paraben (D) Sodium sorbate

9. A soft drink containing sodium benzoate has pH = 3.5 . What percentage of the total benzoate remains as undissociated benzoic acid? [K_a of benzoic acid = 6.3×10^{-5}]

(A) 94.1% (B) 83.4%
(C) 16.6% (D) 50.0%

10. Up to what maximum pH do sorbate salts (potassium, sodium and calcium sorbate) remain effective in suppressing bacteria?

(A) 6.5 (B) 2.73
(C) 4.5 (D) 4.89

11. The food poisoning caused by the bacterium against which nitrite salts are especially effective is called—

(A) typhoid (B) dysentery
(C) cholera (D) botulism

12. Which is the formula of potassium metabisulphite used to preserve raw fruits, fruit juice and wine?

(A) $K_2S_2O_5$ (B) K_2SO_3
(C) $KHSO_3$ (D) $K_2S_2O_3$

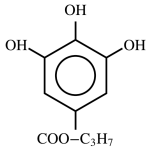
13. Which is the IUPAC name of citric acid used as a food preservative?

(A) 3-Hydroxypentane-1,5-dioic acid
(B) 2-Hydroxybutane-1,4-dioic acid
(C) 2-Hydroxypropane-1,2,3-tricarboxylic acid
(D) Hexa-2,4-dien-1-oic acid

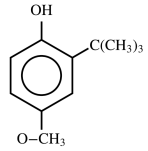
14. Free-radical absorbing antioxidants—
i. TBHQ
ii. beta-carotene
iii. propyl gallate
Which one is correct?

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

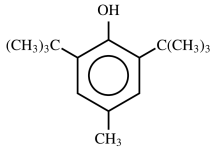
15. Which of the following structures is that of propyl gallate?



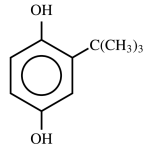
(A)



(B)



(C)



(D)

16. What is the molecular formula of butylated hydroxy toluene (BHT)?

(A) $C_{15}H_{24}O$ (B) $C_{11}H_{16}O_2$
(C) $C_{14}H_{22}O$ (D) $C_{10}H_{14}O_2$

17. In the chelate formed by Fe^{3+} with $EDTA^{4-}$, the coordination number of Fe and the ratio of donor N to donor O atoms of EDTA are respectively—

(A) 6; 1 : 2 (B) 6; 1 : 4
(C) 4; 1 : 2 (D) 4; 1 : 1

18. Used as chelating agents in food—
i. malic acid
ii. fumaric acid
iii. sodium nitrite
Which one is correct?
(A) i and ii (B) ii and iii
(C) i and iii (D) i, ii and iii

19. Which one is correct about blanching in food canning?
(A) It is done at 115°C to 121°C
(B) The food is heated in boiling water or steam for 5 to 10 minutes
(C) It is compulsory for soft vegetables and ripe fruits
(D) It is done after sealing the can

20. In the pressure canning method, under which condition is retorting generally done after exhausting?
(A) 115°C to 121°C, 30 to 100 min
(B) 82°C to 100°C, 10 min
(C) 100°C, 30 min
(D) 75°C to 80°C, 20 min

21. Sucrose $\xrightarrow{X\ (37°C)} A + B$; $A \xrightarrow{Y\ (20–24°C)} C + CO_2$; $C + O_2 \xrightarrow{Z} D + H_2O$. X, Y and Z are respectively —
(A) zymase, invertase, acetobacter
(B) invertase, zymase, acetobacter
(C) invertase, acetobacter, zymase
(D) maltase, zymase, acetobacter

22. With which part of the enzyme protein of live bacteria does the H^+ of vinegar bind to deactivate it?
(A) The π electrons of the benzene ring
(B) The H atom of the $-OH$ group
(C) The N atom of the $-NH-$ of the peptide bond
(D) The O atom of the $-COOH$ group

23. To clearly observe the Tyndall effect using light of wavelength 600 nm, what should be the approximate size of the colloid particles?
(A) 1200 nm (B) 600 nm (C) 300 nm (D) 150 nm

24. Used as a mild antiseptic in talcum powder—
i. zinc stearate
ii. boric acid
iii. magnesium carbonate
Which one is correct?
(A) i, ii and iii (B) i and ii
(C) ii and iii (D) i and iii

25. How many $-OH$ groups are present in one molecule of the compound used as a moisturizer in lipstick?
(A) 3 (B) 2 (C) 4 (D) 1

26. Which is the correct sequence of transformation of peat coal under heat and pressure?
(A) Peat → Bituminous → Lignite → Anthracite
(B) Peat → Lignite → Bituminous → Anthracite
(C) Peat → Anthracite → Bituminous → Lignite
(D) Peat → Lignite → Anthracite → Bituminous

27. In the catalytic converter of vehicles, NO is reduced by CO into which harmless gas?
(A) NH_3 (B) N_2 (C) NO_2 (D) N_2O

28. What is the role of tetrasodium pyrophosphate ($Na_4P_2O_7$) in glass cleaner?
(A) Reducing the surface tension of water
(B) Removing the hardness of water
(C) Evaporating quickly to dry the glass
(D) Dissolving oily dirt

29. Which one is present in the highest percentage in Portland cement?
(A) Fe_2O_3 (B) SiO_2 (C) Al_2O_3 (D) CaO

30. A thermal power plant burns 2.0×10^7 kg of coal containing 1.8% sulphur per year. If all the SO_2 produced is absorbed in a limestone-based FGD plant and converted to gypsum, how many kg of gypsum will be obtained per year?
(A) 1.530×10^6 (B) 1.350×10^6
(C) 3.600×10^5 (D) 1.935×10^6

31. What is the mole ratio of Al_2O_3 and SiO_2 in mullite produced in the ceramic industry?
(A) 3 : 2 (B) 2 : 1 (C) 2 : 3 (D) 1 : 2

32. Gypsum is added to cement mainly to control the quick setting of which component?
(A) $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$ (B) $3CaO \cdot Al_2O_3$
(C) $2CaO \cdot SiO_2$ (D) $3CaO \cdot SiO_2$

33. In which range is the pH of the solution maintained in chrome tanning?
(A) 8.0 to 8.5 (B) 6.5 to 7.0
(C) 4.0 to 4.3 (D) 2.2 to 2.7

34. Which is the formula of sorbic acid?
(A) C_6H_5COOH
(B) CH_3CH_2COOH
(C) $CH_3CH = CH - CH = CH - CHO$
(D) $CH_3CH = CH - CH = CH - COOH$

35. What is ETP?
(A) Liquid waste treatment plant
(B) Air pollution control device
(C) Solid waste recycling centre
(D) Power generation plant

36. Which is the preservative agent in cold cream?
(A) Sodium bicarbonate (B) Glycerine
(C) Liquid paraffin (D) Propyl paraben

37. Which compound is not used in the production of glass?
(A) Na_2SO_4 (B) SiO_2
(C) CaO (D) Na_2CO_3

38. What is the composition of producer gas?
(A) $C + H_2$ (B) $CO + H_2$
(C) $N_2 + H_2$ (D) $2CO + N_2$

39. Which is the antiseptic in baby powder?
(A) Talc (B) Boric acid
(C) Sodium chloride (D) Calcium carbonate

40. What type of mixture is an aerosol?
(A) True solution (B) Suspension
(C) Colloid (D) Pure compound

41. Which is the main protein of milk?
(A) Lactalbumin (B) Lactoglobulin
(C) Casein (D) Keratin

42. Which is the biggest pollutant in a cement factory?
(A) NO_x (B) Dust (C) SO_x (D) CO

43. Which is a harmful component of tannery waste?
(A) Pb (B) Cr (C) As (D) Ni

44. Which of the following is not a component of cement clinker?
(A) CaO (B) SiO_2 (C) Na_2O (D) MgO

45. A food must be kept suitable for canning. If the amount of water vapour in the environment around the food is $45\ gL^{-1}$, what is the maximum amount of water, in gL^{-1}, the food can contain?
(A) 40.5 (B) 36 (C) 18 (D) 27

46. Which compound is used in toilet cleaners to remove drain blockages?
(A) HCl (B) $NaCl$ (C) $CaCO_3$ (D) $NaOH$

47. What is the formula of china clay?
(A) $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$ (B) $CaSO_4 \cdot 2H_2O$
(C) $Na_2CO_3 \cdot 10H_2O$ (D) $CaSO_4 \cdot \frac{1}{2}H_2O$

48. What is the size range of nanoparticles?
(A) 10^{-6} m – 10^{-4} m (B) 10^{-12} m – 10^{-10} m
(C) 10^{-9} m – 10^{-7} m (D) 10^{-3} m – 10^{-1} m

49. Which coal is the best in terms of fuel quality?
(A) Bituminous (B) Lignite
(C) Peat (D) Sub-bituminous

50. Which substance is used in making cold cream?
(A) Ethanol (B) Acetone
(C) Liquid paraffin (D) Sodium chloride