

MHT CET 2022 Mathematics Answer Key PDF

Answer Key

1. **Question 1** Correct Answer – (2) 6n
 Explanation: One mole of citric acid ($C_6H_8O_7$) contains 6 moles of carbon atoms. Thus, n moles of citric acid contain $6n$ moles of carbon atoms. code Code
2. **Question 2** Correct Answer – (1) AgBr
 Explanation: Silver bromide (AgBr) has intermediate properties where the silver ion (Ag^+) is small enough to fit into interstitial spaces (Frenkel defect) while stoichiometry is maintained by co-existing vacancy pairs (Schottky defect).
3. **Question 3** Correct Answer – (1) $Cl_2 > Br_2 > F_2 > I_2$
 Explanation: The bond dissociation enthalpy of F_2 is anomalously lower than Cl_2 and Br_2 because of significant inter-electronic repulsion among lone pairs on the small fluorine atoms.
4. **Question 4** Correct Answer – (2) Low-density polyethylene (LDPE)
 Explanation: LDPE is synthesized under high pressure and temperature, facilitating extensive chain branching, whereas HDPE consists of highly linear polymer chains.
5. **Question 5** Correct Answer – (1) Na/C_2H_5OH
 Explanation: Mendius reduction refers specifically to the organic reaction of reducing alkyl nitriles (cyanides) to primary amines using sodium in ethanol.
6. **Question 6** Correct Answer – (2) 1 m
 Explanation: By definition, the cryoscopic constant (K_f) equals the depression in freezing point (ΔT_f) when the molality (m) of the solution is exactly 1 mol/kg (1 m).
7. **Question 7** Correct Answer – (3) $CaCl_2$
 Explanation: Depression in freezing point is a colligative property. At equal molality, $CaCl_2$ dissociates into 3 ions ($i = 3$), providing a higher particle concentration than $NaCl$ ($i = 2$) or non-electrolytes ($i = 1$).
8. **Question 8** Correct Answer – (1) $S \cdot m^2 \cdot mol^{-1}$
 Explanation: Molar conductivity (Λ_m) is calculated as $\frac{\kappa}{C}$. Its SI unit is Siemens meter squared per mole ($S \cdot m^2 \cdot mol^{-1}$).
9. **Question 9** Correct Answer – (3) 4
 Explanation: A face-centered cubic (FCC) unit cell contains 4 net atoms per unit cell (8 corner atoms $\times 1/8 + 6$ face-centered atoms $\times 1/2$).
10. **Question 10** Correct Answer – (4) Polymorphs always have the same crystal structure.
 Explanation: This statement is incorrect because polymorphic forms are defined as different crystalline structures (shapes) of the same chemical substance.

11. **Question 11** Correct Answer – (2) Magnesium (Mg)
Explanation: Chlorophyll is a green biological pigment containing a porphyrin ring coordinated to a central magnesium (Mg^{2+}) metal ion.
12. **Question 12** Correct Answer – (2) Starch
Explanation: Starch is a naturally occurring biopolymer composed of glucose monomers, whereas polythene, PVC, and Teflon are synthetic addition polymers.
13. **Question 13** Correct Answer – (3) Infinite steps
Explanation: Reversible processes occur infinitesimally slowly in an infinite number of steps, ensuring that the driving force is always nearly equal to the opposing force, yielding maximum work.
14. **Question 14** Correct Answer – (3) 3
Explanation: A strong monobasic acid completely dissociates to give $[\text{H}^+] = 1.0 \times 10^{-3} \text{ M}$. The pH value is $-\log_{10}(10^{-3}) = 3$.
15. **Question 15** Correct Answer – (2) $\Delta U = Q + W$
Explanation: According to the IUPAC convention, the first law of thermodynamics states that the change in internal energy is the sum of heat absorbed by the system and the work done on the system.
16. **Question 16** Correct Answer – (2) $[\text{Ar}]3d^{1-10}4s^{1-2}$
Explanation: This general electronic configuration accommodates elements across the 3d transition series, including anomalous half-filled or fully-filled subshell configurations.
17. **Question 17** Correct Answer – (3) s^{-1}
Explanation: For a first-order rate law, $\text{Rate} = k[\text{A}]$. Dividing the units of rate ($\text{mol} \cdot \text{L}^{-1} \cdot \text{s}^{-1}$) by concentration ($\text{mol} \cdot \text{L}^{-1}$) yields the unit s^{-1} .
18. **Question 18** Correct Answer – (2) Lower
Explanation: Dissolving a non-volatile solute lowers the vapor pressure of the liquid, which consequently depresses (lowers) its freezing point relative to the pure solvent.
19. **Question 19** Correct Answer – (2) Become four times
Explanation: Since the reaction order with respect to reactant B is two, doubling the concentration of B increases the rate of reaction by a factor of $2^2 = 4$.
20. **Question 20** Correct Answer – (2) Direct oxidation of Benzene
Explanation: Phenol is prepared commercially using Dow's process, cumene oxidation, or diazotization of aniline, but direct oxidation of benzene is not a standard synthetic preparation route.
21. **Question 21** Correct Answer – (1) Salicylaldehyde
Explanation: The Reimer-Tiemann reaction of phenol with chloroform in the presence of aqueous alkali introduces a formyl group ($-\text{CHO}$) at the ortho position to yield salicylaldehyde.
22. **Question 22** Correct Answer – (2) Chloroprene
Explanation: Neoprene is a synthetic elastomer produced by the addition polymerization of 2-chloro-1,3-butadiene, commonly known as chloroprene.
23. **Question 23** Correct Answer – (3) Alkylbenzenes
Explanation: The Wurtz-Fittig reaction couples an aryl halide and an alkyl halide in the presence of sodium metal in dry ether to yield alkylsubstituted aromatic hydrocarbons (alkylbenzenes).