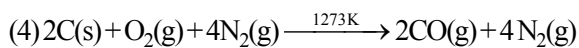
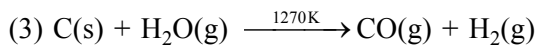
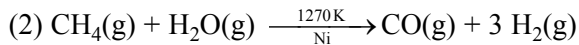
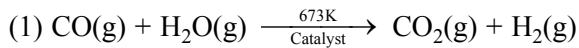


FINAL JEE-MAIN EXAMINATION – SEPTEMBER, 2020

(Held On Saturday 05th SEPTEMBER, 2020) TIME : 9 AM to 12 PM

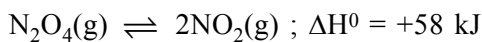
CHEMISTRY

1. The equation that represents the water-gas shift reaction is :



Official Ans. by NTA (1)

2. Consider the following reaction



For each of the following cases (a, b), the direction in which the equilibrium shifts is:

- (a) Temperature is decreased
 (b) Pressure is increased by adding N_2 at constant T
- (1) (a) towards reactant, (b) no change
 (2) (a) towards product, (b) towards reactant
 (3) (a) towards product, (b) no change
 (4) (a) towards reactant, (b) towards product

Official Ans. by NTA (1)

3. The values of the crystal field stabilization energies for a high spin d^6 metal ion in octahedral and tetrahedral fields, respectively, are :

- (1) $-0.4 \Delta_0$ and $-0.27 \Delta_t$
 (2) $-1.6 \Delta_0$ and $-0.4 \Delta_t$
 (3) $-0.4 \Delta_0$ and $-0.6 \Delta_t$
 (4) $-2.4 \Delta_0$ and $-0.6 \Delta_t$

Official Ans. by NTA (3)

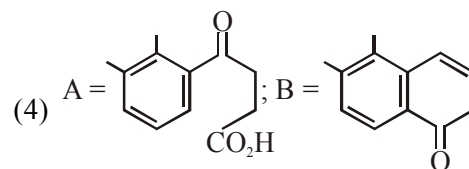
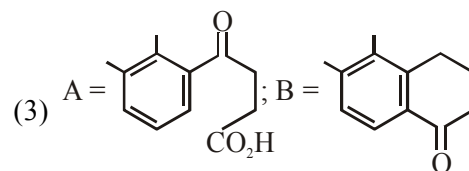
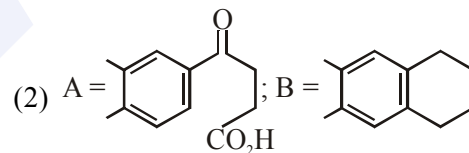
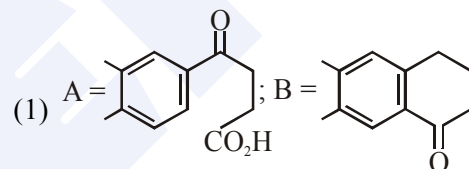
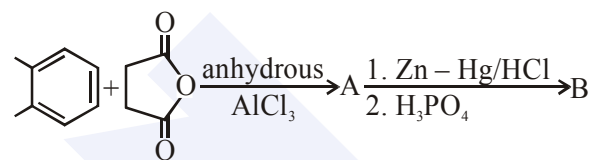
TEST PAPER WITH ANSWER

4. Which of the following is not an essential amino acid :

- (1) Valine (2) Leucine
 (3) Lysine (4) Tyrosine

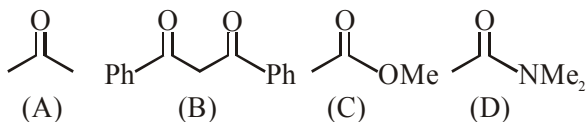
Official Ans. by NTA (4)

5. In the following reaction sequence the major products A and B are :



Official Ans. by NTA (1)

6. The increasing order of the acidity of the α -hydrogen of the following compounds is :



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

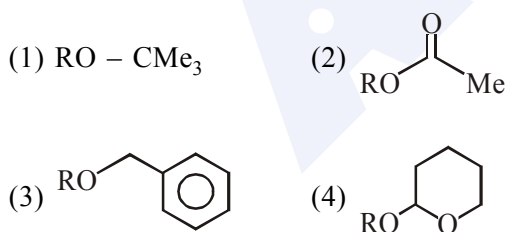
Official Ans. by NTA (4)

7. An Ellingham diagram provides information about :

- (1) the pressure dependence of the standard electrode potentials of reduction reactions involved in the extraction of metals.
- (2) the kinetics of the reduction process.
- (3) the temperature dependence of the standard Gibbs energies of formation of some metal oxides.
- (4) the conditions of pH and potential under which a species is thermodynamically stable.

Official Ans. by NTA (3)

8. Which of the following derivatives of alcohols is unstable in an aqueous base ?



Official Ans. by NTA (2)

9. The structure of PCl_5 in the solid state is

- (1) square pyramidal
- (2) tetrahedral $[PCl_4]^+$ and octahedral $[PCl_6]^-$
- (3) square planar $[PCl_4]^+$ and octahedral $[PCl_6]^-$
- (4) trigonal bipyramidal

Official Ans. by NTA (2)

10. The most appropriate reagent for conversion of C_2H_5CN into $CH_3CH_2CH_2NH_2$ is :

- (1) $Na(CN)BH_3$ (2) $LiAlH_4$
- (3) $NaBH_4$ (4) CaH_2

Official Ans. by NTA (2)

11. The difference between the radii of 3rd and 4th orbits of Li^{2+} is ΔR_1 . The difference between the radii of 3rd and 4th orbits of He^+ is ΔR_2 . Ratio $\Delta R_1 : \Delta R_2$ is :

- (1) 8 : 3 (2) 3 : 2
- (3) 3 : 8 (4) 2 : 3

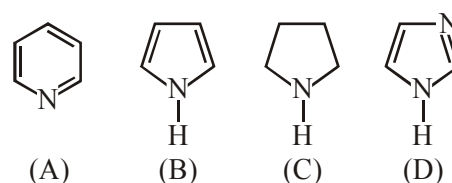
Official Ans. by NTA (4)

12. A flask contains a mixture of compounds A and B. Both compounds decompose by first-order kinetics. The half-lives for A and B are 300 s and 180 s, respectively. If the concentrations of A and B are equal initially, the time required for the concentration of A to be four times that of B (in s) : (Use $\ln 2 = 0.693$)

- (1) 180 (2) 120
- (3) 300 (4) 900

Official Ans. by NTA (4)

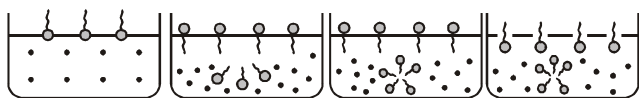
13. The increasing order of basicity of the following compounds is



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

Official Ans. by NTA (4)

14. Identify the correct molecular picture showing that happens at the critical micellar concentration (CMC) of an aqueous solution of a surfactant (○ polar head; ~ non-polar tail; • water).



(A) (B) (C) (D)

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

Official Ans. by NTA (3)

15. If a person is suffering from the deficiency of nor-adrenaline, what kind of drug can be suggested ?

- (1) Anti-inflammatory (2) Analgesic
(3) Antihistamine (4) Antidepressant

Official Ans. by NTA (4)

16. The correct electronic configuration and spin-only magnetic moment (BM) of Gd^{3+} ($Z = 64$), respectively, are

- (1) $[Xe]5f^7$ and 8.9 (2) $[Xe]4f^7$ and 7.9
(3) $[Xe]5f^7$ and 7.9 (4) $[Xe]4f^7$ and 8.9

Official Ans. by NTA (2)

17. The condition that indicates a polluted environment is

- (1) BOD value of 5 ppm
(2) eutrophication
(3) 0.03% of CO_2 in the atmosphere
(4) pH of rain water to be 5.6

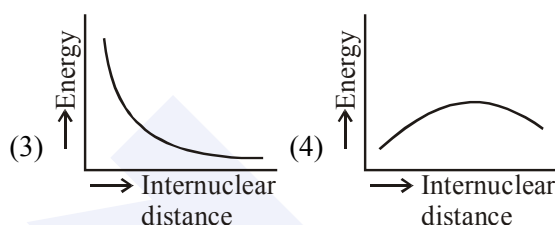
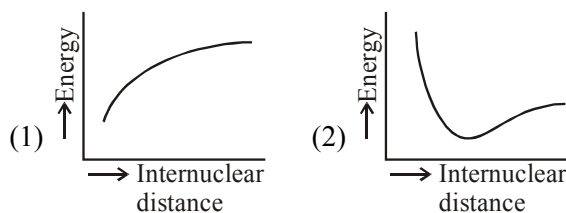
Official Ans. by NTA (2)

18. In the sixth period, the orbitals that are filled are

- (1) 6s, 5f, 6d, 6p (2) 6s, 6p, 6d, 6f
(3) 6s, 5d, 5f, 6p (4) 6s, 4f, 5d, 6p

Official Ans. by NTA (4)

19. The potential energy curve for the H_2 molecule as a function of internuclear distance is :



Official Ans. by NTA (2)

20. A diatomic molecule X_2 has a body-centred cubic (bcc) structure with a cell edge of 300 pm. The density of the molecule is 6.17 g cm^{-3} . The number of molecules present in 200 g of X_2 is (Avogadro constant (N_A) = $6 \times 10^{23} \text{ mol}^{-1}$)

- (1) $8 N_A$ (2) $40 N_A$
(3) $4 N_A$ (4) $2 N_A$

Official Ans. by NTA (3)

21. an oxidation-reduction reaction in which 3 electrons are transferred has a ΔG° of $17.37 \text{ kJ mol}^{-1}$ at 25°C . The value of E_{cell}° (in V) is _____ $\times 10^{-2}$

(1 F = $96,500 \text{ C mol}^{-1}$)

Official Ans. by NTA (6)

22. The minimum number of moles of O_2 required for complete combustion of 1 mole of propane and 2 moles of butane is _____.

Official Ans. by NTA (18)

23. The total number of coordination sites in ethylenediaminetetraacetate ($EDTA^{4-}$) is _____.

Official Ans. by NTA (6)

24. The number of chiral carbon(s) present in peptide, Ile-Arg-Pro, is _____.

Official Ans. by NTA (4)

25. A soft drink was bottled with a partial pressure of CO_2 of 3 bar over the liquid at room temperature. The partial pressure of CO_2 over the solution approaches a value of 30 bar when 44 g of CO_2 is dissolved in 1 kg of water at room temperature. The approximate pH of the soft drink is _____ $\times 10^{-1}$.

(First dissociation constant of $\text{H}_2\text{CO}_3 = 4.0 \times 10^{-7}$; $\log 2 = 0.3$; density of the soft drink = 1 g mL^{-1})

Official Ans. by NTA (37)