

SUB : Chemistry
SEM. : 4
SET: A

DATE: 25/1/2018
MARKS: 50
TIME: 1.5 HRS

NUMERICALS & CONVERSIONS (A GROUP)

The following NUMERICALS contain 2 marks each :

- CsBr crystallizes in a body centred cubic lattice. The unit cell length is 436.6 pm. Given that the atomic mass of Cr = 133 and that of Br = 80 amu and Avogadro number being $6.02 \times 10^{23} \text{ mol}^{-1}$. The density of CsBr is**
a) 0.425 g cm^{-3} b) 8.50 g cm^{-3} c) 4.25 g cm^{-3} d) 42.5 g cm^{-3}
- The cell edge of a fcc crystal is 100 pm and its density is 10.0 g cm^{-3} . The number of atoms in 100 g of this crystal is :**
a) 1×10^{25} b) 2×10^{25} c) 3×10^{25} d) 4×10^{25}
- Addition of 0.64 g of a compound X, to 50 ml of benzene (density = 0.850 g ml^{-1}) lowers the freezing point by 0.48°C . If K_f of benzene is 5.12, the molar mass of the compound X is**
a) 160.6 b) 321.2 c) 80.3 d) 481.8
- 0.5 molal aqueous solution of a weak acid (HX) is 20% ionized. If K_f of water is $1.86 \text{ K kg mol}^{-1}$, the lowering in freezing point of the solution is:**
a) 0.56 K b) 1.12 K c) -0.56 K d) -1.12 K
- What is the osmotic pressure of a $0.0020 \text{ mol dm}^{-3}$ sucrose ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) solution at 20°C ? (Molar gas constant, $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$, $1 \text{ dm}^3 = 0.001 \text{ m}^3$)**
a) 4870 Pa b) 4.87 Pa c) 0.00487 Pa d) 0.33 Pa
- The freezing point depression constant for water is $-1.86^\circ\text{C m}^{-1}$. If 5.00 g Na_2SO_4 is dissolved in 45.0 g H_2O , the freezing point is changed by -3.82°C . Calculate the van't Hoff factor for Na_2SO_4 .**
a) 2.05 b) 2.63 c) 3.11 d) 0.381
- The resistance of 0.1 N solution of acetic acid of 250 ohm when measures in a cell of cell constant 1.15 cm^{-1} . The equivalent conductance (in $\text{ohm}^{-1}\text{cm}^2\text{equiv}^{-1}$) of 0.1N acetic acid is:**
a) 46 b) 9.2 c) 18.4 d) 0.023
- Salts of A (at. Mass = 7), B (at. Mass = 27) and C (at. Mass = 64) were electrolysed under identical conditions using the same quantity of electricity. It was found that when 2.1 g of A was deposited, the weights of B and C deposited were 2.7 g and 9.6 g. The valancies of A, B and C are respectively:**
a) 3, 1 and 2 b) 1, 3 and 2 c) 3, 1 and 3 d) 2, 3 and 3
- The molar conductance of a 0.01 M solution of acetic acid at 298 K is $16.5 \text{ ohm}^{-1}\text{cm}^2\text{mol}^{-1}$. Its specific conductance is:**
a) $1.65 \text{ ohm}^{-1} \text{ cm}^{-1}$ b) $1.65 \times 10^{-4} \text{ ohm}^{-1} \text{ cm}^{-1}$
c) $1.65 \times 10^{-2} \text{ ohm cm}$ d) $1.65 \times 10^{-4} \text{ ohm}^{-1} \text{ cm}$
- The rusting of iron takes place as follows:**
$$2\text{H}^+ + 2\text{e}^- + \frac{1}{2}\text{O}_2 \rightarrow \text{H}_2\text{O}(l) \quad E^\circ = +1.23 \text{ V}$$
$$\text{Fe}^{2+} + 2\text{e}^- \rightarrow \text{Fe}(s) \quad E^\circ = -0.44 \text{ V}$$

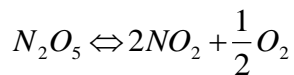
Calculate ΔG° for the net process:

a) -322 kJ mol^{-1} b) -161 kJ mol^{-1} c) -152 kJ mol^{-1} d) -76 kJ mol^{-1}
- Given the data at 25°C**
$$\text{Ag} + \text{I}^- \rightarrow \text{AgI} + \text{e}^- \quad E^\circ = 0.152 \text{ V}$$
$$\text{Ag} \rightarrow \text{Ag}^+ + \text{e}^- \quad E^\circ = -0.800 \text{ V}$$

What is the value of $\log K_{sp}$ for AgI? ($2.303 \text{ RT/F} = 0.059 \text{ V}$)

a) + 8.612 b) -37.83 c) -16.13 d) -8.12

12. The half life period of the reaction:



is 24 hrs at 30°C. Starting with 10 g of N_2O_5 , how many grams of N_2O_5 will remain after a period of 96 hours?

a) 1.25g b) 0.63 g c) 1.75 g d) 0.5 g

13. What is the half life period of a radioactive substance if 87.5% of any given amount of the substance disintegrates in 40 minutes?

a) 160 min b) 10 min c) 20 min d) 13 min 35 sec

14. Observe the following reaction $2A + B \rightarrow C$.

The rate of formation of C is $2.2 \times 10^{-3} \text{ mol L}^{-1} \text{ min}^{-1}$. What is the value of $-\frac{d[A]}{dt}$

(in $\text{mol L}^{-1} \text{ min}^{-1}$)?

a) 2.2×10^{-3} b) 1.1×10^{-3} c) 4.4×10^{-3} d) 5.5×10^{-3}

15. If 60% of a first order reaction was completed in 60 minutes, 50% of the same reaction would be completed in approximately:

a) 45 minutes b) 60 minutes c) 40 minutes d) 50 minutes

CONVERT : (Contains 2 marks each)

1. Ethanol to Ethene.
2. BDC to Phenol.
3. BDC to P. Chloro Benzene Sulphonic acid.
4. Acetone from propene.
5. Ethoxy benzene from phenol.
6. Ethanal from acetic acid.
7. Ethanol to propan-2-ol.
8. Propan-2-ol to tert butyl alcohol.
9. Ethanol to Acetic acid.
10. Phenol to picric acid.

PLEASE NOTE : ON 27/1/2018 Saturday Physics TEST For B Group WILL BE OF SEM – 4 CH – 5 to 8 (Theory + MCQ's)

NUMERICALS & CONVERSIONS (A GROUP)

The following NUMERICALS contain 2 marks each :

- Addition of 0.64 g of a compound X, to 50 ml of benzene (density = 0.850 g ml⁻¹) lowers the freezing point by 0.48°C. If K_f of benzene is 5.12, the molar mass of the compound X is
a) 160.6 b) 321.2 c) 80.3 d) 481.8
- The half life period of the reaction:
$$N_2O_5 \rightleftharpoons 2NO_2 + \frac{1}{2}O_2$$
is 24 hrs at 30°C. Starting with 10 g of N₂O₅, how many grams of N₂O₅ will remain after a period of 96 hours?
a) 1.25g b) 0.63 g c) 1.75 g d) 0.5 g
- The resistance of 0.1 N solution of acetic acid of 250 ohm when measures in a cell of cell constant 1.15 cm⁻¹. The equivalent conductance (in ohm⁻¹cm²equiv⁻¹) of 0.1N acetic acid is:
a) 46 b) 9.2 c) 18.4 d) 0.023
- What is the half life period of a radioactive substance if 87.5% of any given amount of the substance disintegrates in 40 minutes?
a) 160 min b) 10 min c) 20 min d) 13 min 35 sec
- The freezing point depression constant for water is – 1.86°C m⁻¹. If 5.00 g Na₂SO₄ is dissolved in 45.0 g H₂O, the freezing point is changed by – 3.82°C. Calculate the van't Hoff factor for Na₂SO₄.
a) 2.05 b) 2.63 c) 3.11 d) 0.381
- Observe the following reaction 2 A + B → C.
The rate of formation of C is 2.2 x 10⁻³ mol L⁻¹ min⁻¹. What is the value of $-\frac{d[A]}{dt}$ (in mol L⁻¹ min⁻¹)?
a) 2.2 x 10⁻³ b) 1.1 x 10⁻³ c) 4.4 x 10⁻³ d) 5.5 x 10⁻³
- The rusting of iron takes place as follows:
$$2H^+ + 2e^- + \frac{1}{2}O_2 \rightarrow H_2O(l) \quad E^\circ = +1.23 V$$
$$Fe^{2+} + 2e^- \rightarrow Fe(s) \quad E^\circ = -0.44 V$$
Calculate ΔG° for the net process:
a) – 322 kJ mol⁻¹ b) – 161 kJ mol⁻¹ c) – 152 kJ mol⁻¹ d) – 76 kJ mol⁻¹
- If 60% of a first order reaction was completed in 60 minutes, 50% of the same reaction would be completed in approximately:
a) 45 minutes b) 60 minutes c) 40 minutes d) 50 minutes
- The cell edge of a fcc crystal is 100 pm and its density is 10.0 g cm⁻³. The number of atoms in 100 g of this crystal is :
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11. 0.5 molal aqueous solution of a weak acid (HX) is 20% ionized. If K_f of water is $1.86 \text{ K kg mol}^{-1}$, the lowering in freezing point of the solution is:
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13. What is the osmotic pressure of a $0.0020 \text{ mol dm}^{-3}$ sucrose ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) solution at 20°C ? (Molar gas constant, $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$, $1 \text{ dm}^3 = 0.001 \text{ m}^3$)
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14. Given the data at 25°C
 $\text{Ag} + \text{I}^- \rightarrow \text{AgI} + \text{e}^- \quad E^\circ = 0.152 \text{ V}$
 $\text{Ag} \rightarrow \text{Ag}^+ + \text{e}^- \quad E^\circ = - 0.800 \text{ V}$
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