CHEMISTRY

1. Total number of P–O–P bonds in $H_4P_2O_7$, P_4O_{10} and $(HPO_3)_3$:

Ans. **10**

Sol.

	P–O–P bond
$H_4P_2O_7$	1
P_4O_{10}	6
$(HPO_3)_3$	3
	10

2. Calculate ratio of radii of 2^{nd} and 3^{rd} bohr orbit of hydrogen :

(1) $\frac{9}{4}$ (2) $\frac{4}{9}$ (3) $\frac{3}{2}$ (4) $\frac{2}{3}$

Ans. **(2)**

Sol. $r = 0.529\frac{n^2}{Z}$

$$\frac{r_{2^{nd}}}{r_{3^{rd}}} = \frac{(2)^2}{(3)^2} = \frac{4}{9}$$

3. Find the total change in oxidation number of Mn and iodine when $KMnO_4$ react with I^- in acidic medium.

Ans. **6**

Sol. $MnO_4^- + I^- \longrightarrow Mn^{2+} + I_2$

+7 –1 +2 0

Change in oxidation number of Mn = 5

Change in oxidation number of I^- = 1

4. 20 ml, 0.01M $[Co(H_2O)_5Cl]Cl_2$ react with 0.1M $AgNO_3$ solution find volume of $AgNO_3$ used for complete reaction.

Ans. **4 ml**

Sol. $[Co(H_2O)_5Cl]Cl_2 + 2AgNO_3 \longrightarrow [Co(H_2O)_5Cl]^{2+} + 2AgCl$

0.2 mmole 0.4 mmole

$$V_{(AgNO_3)} = \frac{0.4}{0.1}$$

$$= 4 \text{ ml}$$

5. Ratio of SiO_2 & Al_2O_3 in cement is :

(1) 1.5 (2) 2.5 (3) 3 (4) 9

Ans. **(3)**

Sol. The ratio of silica (SiO_2) to alumina (Al_2O_3) should be between 2.5 and 4.

6. Which of the following complex has maximum splitting energy ?

(1) $[Fe(H_2O)_6]^{2+}$ (2) $[Mn(H_2O)_6]^{2+}$ (3) $[Co(H_2O)_6]^{2+}$ (4) $[Ni(H_2O)_6]^{2+}$

Ans. **(4)**

Sol. According to Irving Williams series $[Ni(H_2O)_6]^{2+}$ has maximum splitting energy.

7. Vapour pressure of 30% $\frac{w}{w}$ glucose solution is _____ (V.P. of pure water = 24 torr)

Ans. **23 torr**

Sol. $$\frac{P^\circ - P_s}{P_s} = \frac{n}{N}$$

$$\Rightarrow \frac{24 - P_s}{P_s} = \frac{\frac{30}{180}}{\frac{70}{18}} = \frac{3}{70}$$

$$\Rightarrow 1680 - 70\,P_s = 3\,P_s$$

$$P_s = \frac{1680}{73}$$

$$= 23 \text{ torr}$$

8. How many of the following are isoelectronic species?

F^-, Mg^{2+}, Al^{3+}, O^{2-}, Na^+, F, O^-

Ans. **5**

Sol. Mg^{2+}, Al^{3+}, Na^+, O^{2-}, F^- all are having $10e^-$.

9. Oxidation state of Cr in Chromyl chloride_____.

Ans. 6

Sol. CrO_2Cl_2

10. **Statement-1 :** According to Bohr's model angular momentum is quantized for stationary orbit.

Statement-2 : Bohr model does not follow Heisenberg uncertainty principle.

(1) Both statements-1 and 2 are correct.

(2) Both statement-1 and 2 are incorrect.

(3) Statement-1 is correct and statement-2 is incorrect.

(4) Statement-1 is incorrect and statement-2 is correct.

Ans. **(1)**

11. How many of the following statements are correct ?

(i) Conductivity (k) decreases with increase in dilution for both strong and weak electrolyte.

(ii) Molar conductivity increases with increase in dilution for both strong and weak electrolyte.

(iii) Molar conductivity increases with increase in degree of dissociation (α) for weak electrolyte.

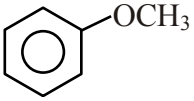
(iv) Change in molar conductivity is same for both strong and weak electrolyte with increase in dilution.

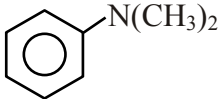
Ans. **(3)**

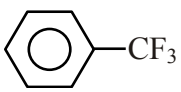
Sol. Statements (i), (ii) & (iii) are correct.

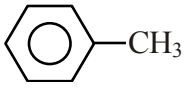
12. Nucleophilicity order of following is :

(a) 

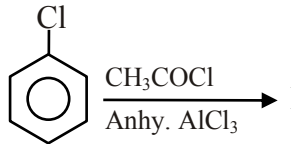
(b) 

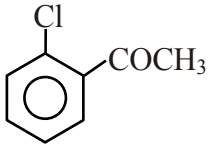
(c) 

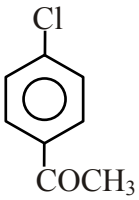
(d) 

(e) 

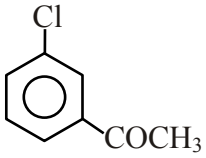
Ans. c > b > e > a > d.

13. 

(1) 

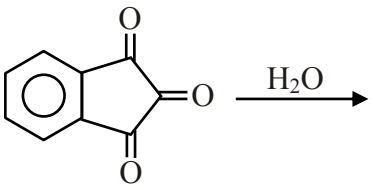
(2) 

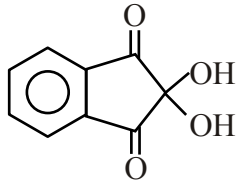
(3) 

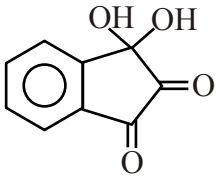
(4) 

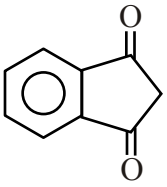
Ans. (2)

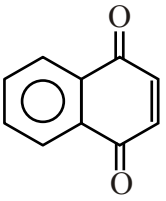
Sol. It is Friedel craft reactions.

14. 

(1) 

(2) 

(3) 

(4) 

Ans. (1)

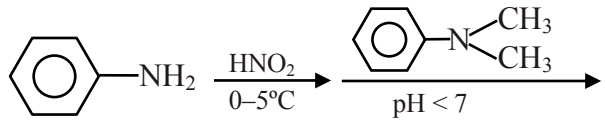
15. The possibility of photochemical smog formation will be minimum at
(1) Kolkata in October (2) Mumbai in May
(3) Srinagar in January (4) New Delhi in August

Ans. (3)

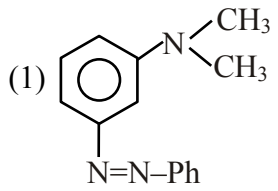
16. Match the list.

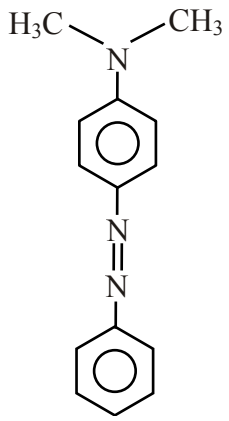
List-I	**List-II**
(a) $CF_2=CF_2$	(p) Nylon-6
(b) Isoprene	(q) Orlon
(c) Caprolactam	(r) Teflon
(d) Acrylonitrile	(s) Natural rubber

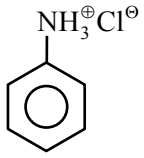
Ans. a-r, b-s, c-p, d-q

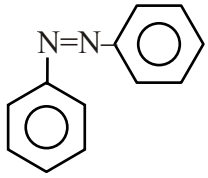
17. 

Product P is :

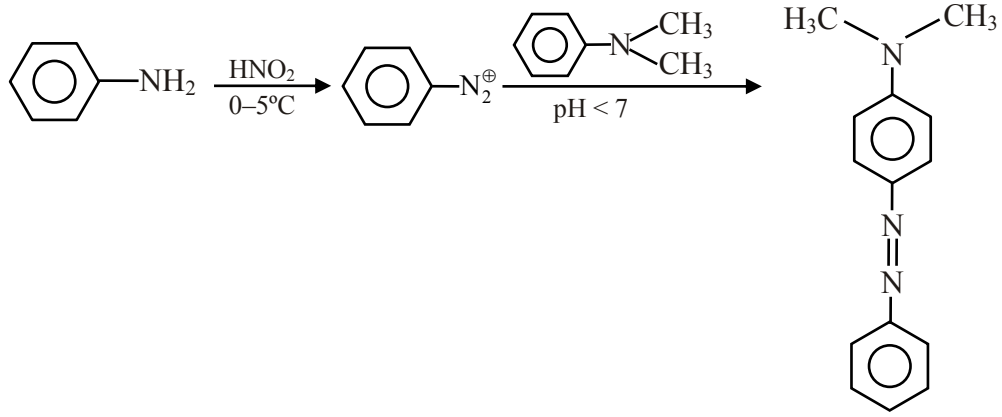
(1) 

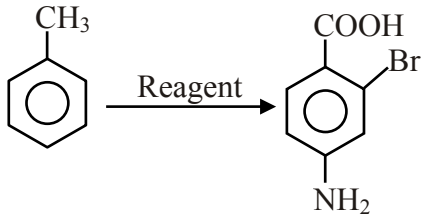
(2) 

(3) 

(4) 

Ans. (2)

Sol. 

18. 

set of reagent will be –

(1) I-$HNO_3 + H_2SO_4$, II-$Br_2/FeBr_3$, III-$KMnO_4/H^+$, IV-Sn / HCl

(2) I-$Br_2/FeBr_3$, II-$KMnO_4/H^+$, III-$HNO_3 + H_2SO_4$, IV-Sn / HCl

(3) I-$KMnO_4/H^+$, II-$HNO_3 + H_2SO_4$, III-$Br_2/FeBr_3$, IV-Sn / HCl

(4) None of these

Ans. (1)