WEEKLY TEST OYM TEST - 32 Balliwala
SOLUTION Date 15-12-2019

[PHYSICS]

1. Two vectors of equal magnitude and directed in opposite directions give zero resultant.

3. For normal vectors, $\vec{A}.\vec{B} = 0$. This is the case with the vector in option (c)

$(\hat{i}A\cos\theta + \hat{j}A\sin\theta).(\hat{i}B\sin\theta - \hat{j}B\cos\theta) = AB\sin\theta\cos\theta - AB\sin\theta\cos\theta = 0$

4. $C = \left[A^2 + B^2 + 2AB\cos\frac{2\pi}{3}\right]^{1/2}$

$= \left[A^2 + B^2 + 2A\left(-\frac{1}{2}\right)\right]^{1/2} = A = B$

5. $\vec{A}\times\vec{B}$ is directed opposite to $\vec{B}\times\vec{A}$.

6. Projection of $\vec{A}$ on y-axis is given by $\vec{A}.\hat{j}$. Here, $(3\hat{i} + 4\hat{k}).\hat{j} = 0$

7. $\tan\alpha = \frac{B\sin\theta}{A + B\cos\theta} = \frac{\sin\theta}{\frac{A}{B} + \cos\theta}$ and $\tan\beta = \frac{A\sin\theta}{B + A\cos\theta} = \frac{\sin\theta}{\frac{B}{A} + \cos\theta}$

$\therefore$ $\alpha < \beta$ when $\frac{A}{B} > 1$

This will make $\frac{B}{A} < 1$

8. $\tan\beta = \frac{B\sin\theta}{A + B\cos\theta}$

or $\tan 90^\circ = -\frac{B\sin\theta}{A + B\cos\theta}$

$\therefore$ $A + B\cos\theta = 0$

or $\theta = \cos^{-1}\left(-\frac{A}{B}\right)$

9. $(\vec{A} + \vec{B}).(\vec{A} - \vec{B}) = 0$ (As A = B)

$\therefore$ $(\vec{A} + \vec{B})$ is $\perp$ $(\vec{A} - \vec{B})$.

10. $(\vec{A} + 2\vec{B})\vec{A} = 0$

i.e., $A^2 + 2AB\cos\theta = 0$

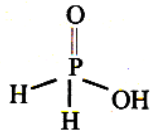
Also $A^2 + B^2 + 2AB\cos\theta = R^2$

Hence, $B^2 = R^2$, i.e, B = R

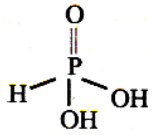
[CHEMISTRY]

21.

(b) Phosphinic acid as shown in structure below has one P—OH bend thus it is monobasic or monoprotic


(Monoprotic)

Phosphonic acid as shown in structure has two P–OH bonds thus it is dibasic or diprotic


(Diprotic acid)

22.

(a) The acids which contain P-H bond have strong reducing properties. Thus H_3PO_2 acid is good reducing agent as it contains two P–H bonds and reduces, for example, $AgNO_3$ to metallic silver.

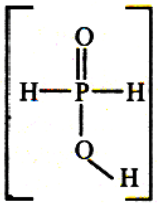
$$4\,AgNO_3 + 2H_2O + H_3PO_2 \longrightarrow 4Ag + 4HNO_3 + H_3PO_4$$

23.

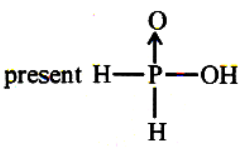
(c)

Compound		Oxidation number of nitrogen
N_2H_4	=	–2
NH_3	=	–3
N_3H	=	–1/3
NH_2OH	=	–1

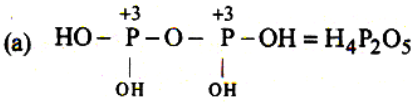
24.

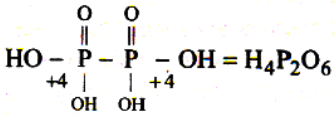
(b)  Hypophosphorous acid

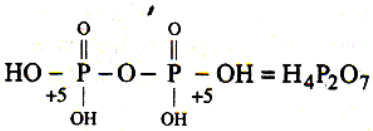
(H_3PO_2) is a monobasic acid. i.e., it has only one ionisable hydrogen atom or one OH is

present 

25.

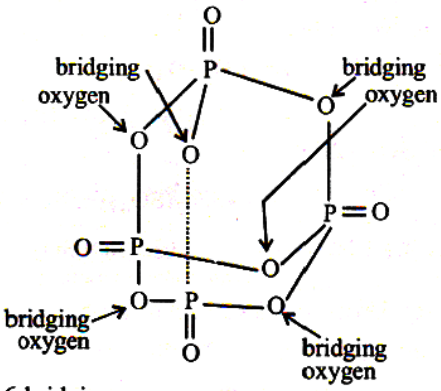
(a) 





26.

(b)



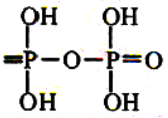
i.e. 6-bridging oxygen.

27.

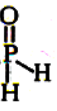
(c) Nitrogen form N_2 (i.e. $N \equiv N$) but phosphorus form P_4, because in P_2, $p_\pi - p_\pi$ bonding is present which is a weaker bonding.

28.

(b)

(a) $H_4P_2O_7$ $\Rightarrow$ 

Pyrophosphoric acid

(b) H_3PO_2 $\Rightarrow$ 

29.

(c) Ammonium sulphate is a salt of weak base and strong acid, so it produces acidity. Hence aqueous solution of ammonium sulphate increases the acidity of soil.

30.

(a) We know that empirical formula of hypophosphorus acid is H_3PO_2. In this only one ionisable hydrogen atom is present i.e. it is monobasic. Therefore option (a) is correct structural formula of it.

31.

(b) Brown ring test is done for the confirmation of NO_3^- ions.

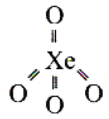
$$NaNO_3(aq) + H_2SO_4(aq) \longrightarrow NaHSO_4(aq) + HNO_3(aq)$$

$$6FeSO_4 + 2HNO_3 + 3H_2SO_4 \longrightarrow 3Fe_2(SO_4)_3 + 2NO + 4H_2O$$

$$FeSO_4 + NO \longrightarrow [Fe(NO)]SO_4$$

Ferrous nitroso-sulphate (Brown ring)

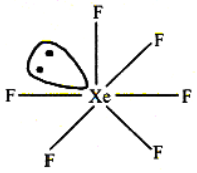
32.

(b) 

(Tetrahedral sp^3)

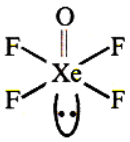
33.

(a) **XeF_6**



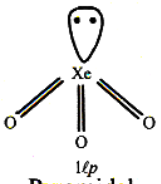
distorted octahedral

$XeOF_4$



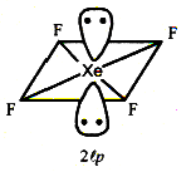
Square pyramidal

XeO_3



Pyramidal

XeF_4



Square planar

34.

(d) The most abundant rare gas found in the atmosphere is argon and not helium.

35.

(d) On account of highly stable ns^2np^6 configuration in the valence shell. These elements have no tendency either to lose gain or share electrons with atoms of other elements i.e., their combining capacity or valency is zero. Further all the orbitals in the atoms of these elements are doubly occupied i.e electrons are not available for sharing.

36.

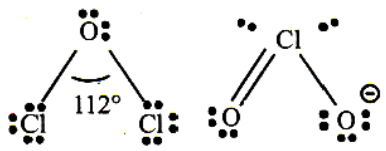
(a) $CaOCl_2 + 2HCl \rightarrow CaCl_2 + H_2O + Cl_2$

Bleaching powder

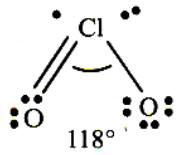
37.

(c) The correct order of increasing bond angle is $Cl_2O < ClO_2^- < ClO_2$

Cl_2O $\quad$ ClO_2^-



ClO_2



* In ClO_2^- there are 2 lone pairs of electrons present on the central chlorine atom. Therefore

the bond angle in ClO_2^- is less than 118° which is the bond angle in ClO_2 which has less number of electrons on chlorine.

38.

(b) If acidic nature is high, K_a is high and pK_a is low

	H_2O	H_2S
K_a	1.8×10^{-6}	1.3×10^{-7}
	H_2Se	H_2Te
K_a	1.3×10^{-4}	2.3×10^{-3}

since $pK_a = -\log K_a$

Hence the order of pK_a will be

$H_2O > H_2S > H_2Se > H_2Te$

39.

(b) As oxidation number of central atom in oxy-acid increases strength increases. Hence the correct order of acidic strength is

$$\overset{+1}{H}\overset{+1}{Cl}O < \overset{+3}{H}\overset{+3}{Cl}\overset{-2}{O_2} < \overset{+1}{H}\overset{+5}{Cl}\overset{-2}{O_3} < \overset{+1}{H}\overset{+7}{Cl}\overset{-2}{O_4}$$

40.

(c) Bond dissociation energy of fluorine is less because of its small size and repulsion between electrons of two atoms. So option (c) is wrong order. The correct order is

$[Cl_2 > Br_2 > F_2 > I_2]$