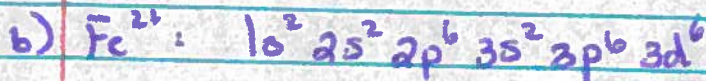


# Exam Review Answer



2.

(4s 1) - Key difference.



	$\uparrow$	$\downarrow$
n	2	2
l	0	0
ml	0	0
ms	$1/2$	$-1/2$

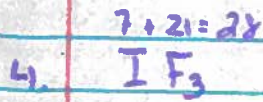


	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$
n	3	3	3
l	1	1	1
ml	-1	0	1
ms	$1/2$	$-1/2$	$1/2$

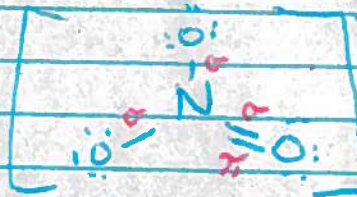
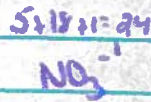


	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$
n	3	3	3	3	3
l	2	2	2	2	2
ml	-2	-1	0	1	2
ms	$1/2$	$-1/2$	$1/2$	$-1/2$	$1/2$

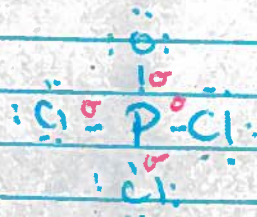
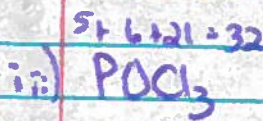




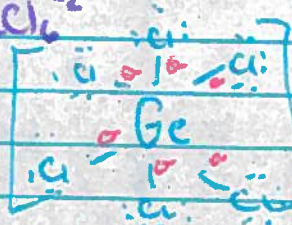
T-shaped  
 polar  
 L.F., D.P.  
 $\text{Sp}^3\text{d}$



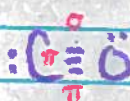
trigonal planar  
 ionic  
 L.F.  
 $\text{Sp}^2$



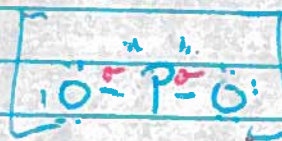
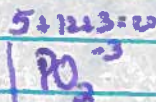
tetrahedral  
 polar  
 L.F., D.P.  
 $\text{Sp}^3$



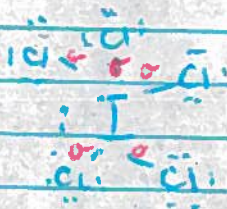
octahedral  
 ionic  
 L.F.  
 $\text{Sp}^3\text{d}^2$



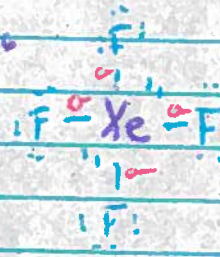
Linear  
 polar  
 L.F., D.P.  
 $\text{Sp}$



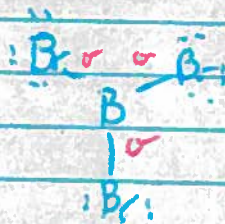
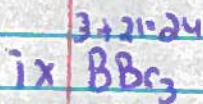
bent  
 ionic  
 L.F., D.P.  
 $\text{Sp}^3$



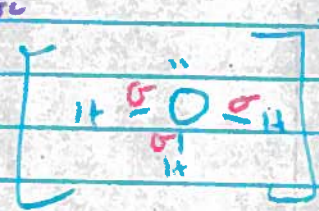
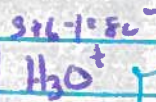
square pyramidal  
 polar  
 L.F., D.P.  
 $\text{Sp}^3\text{d}^2$



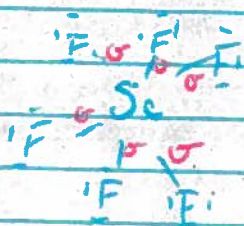
square planar  
 polar  
 L.F., D.P.  
 $\text{Sp}^3\text{d}^2$



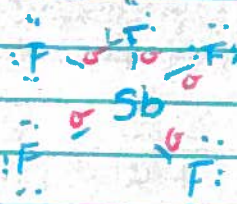
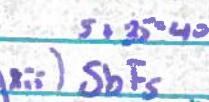
square planar  
 non-polar  
 L.F.  
 $\text{Sp}^2$



trigonal pyramidal  
 ionic  
 L.F., H bond.  
 $\text{Sp}^3$



octahedral  
 non-polar  
 L.F.  
 $\text{Sp}^3\text{d}^2$



trigonal bipyramidal  
 non-polar  
 L.F.  
 $\text{Sp}^3\text{d}$



$$5. \quad q = mc\Delta t$$

$$q = (5.65)(4.18)(55.4) \\ = 1308.38 \text{ kJ} \quad (\text{mass is kg}) \\ (\text{since } V=L)$$

$$\Delta H = n \Delta H_x \\ -1308.38 \text{ kJ} = 0.315 \text{ mol } \Delta H_x$$

$$\Delta H_x = -4153.59 \text{ kJ/mol}$$

$$b. \quad q = mc\Delta t$$

$$q = (3.25)(4.18)(40.2) \\ = 546.117 \text{ kJ}$$

$$n = \frac{22 \text{ g}}{44.11}$$

$$n = 0.4987 \text{ mol}$$

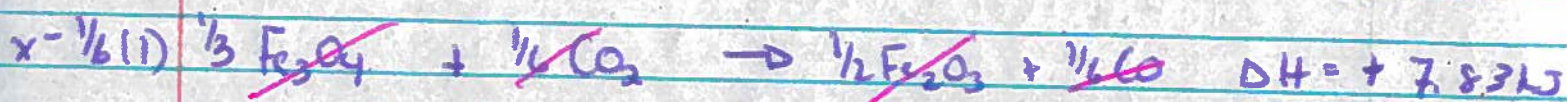
$$\Delta H = n \Delta H_x$$

$$-546.117 = 0.4987 \Delta H_x$$

$$\Delta H_x = -1094.97 \text{ kJ/mol}$$







9) Reactants  
neither  
products

10) Left  
Left  
Left  
right  
Left  
None.  
null  
null  
null  
null.  
decrease.  
null



E            4.3                            4.3                            2x

$$K = \frac{[\text{NO}]^2}{[\text{O}_2][\text{N}_2]} \quad 6.3 \times 10^{-4} = \frac{[2x]^2}{[4.3][4.3]}$$

$$6.3 \times 10^{-4} = \frac{4x^2}{[4.3]^2}$$

$$4x^2 = 0.0116487 \quad x = 0.05396 \text{ M}$$

$$\sqrt{x^2} = \sqrt{0.002912175} \quad [\text{NO}] = 2x$$

$$= 0.108 \text{ M}$$





I	0.3 M	0	0
C	-2x	+x	+3x
E	0.3-2x	x	3x

$x = 0.045 \text{ M}$

$$[\text{CH}_4] = 0.3 - 2[0.045]$$

$$= 0.21$$

$$K = \frac{[\text{C}_2\text{H}_4][\text{H}_2]^3}{[\text{CH}_4]^2}$$

$$[\text{C}_2\text{H}_4] = 0.045 \text{ M}$$

$$[\text{H}_2] = [0.045] \cdot 3$$

$$= 0.135$$

$$K = \frac{[0.045][0.135]^3}{[0.21]^2}$$

$$K = 0.00251$$

$$= 2.51 \times 10^{-3}$$



I	0.04667	0	0
C	-x	+x	+x
E	0.04667-x	x	x

$$K = \frac{[\text{H}_2][\text{S}]}{[\text{H}_2\text{S}]} \quad 1.67 \times 10^{-7} = \frac{x^2}{(0.04667-x)}$$

$$0.04667 - x \approx 0.04667$$

100 Rule

$$[\text{H}_2] = 8.83 \times 10^{-5} \text{ M}$$

$$[\text{S}] = 8.83 \times 10^{-5} \text{ M} \quad 1.67 \times 10^{-7} = \frac{x^2}{0.04667}$$

$$x = 8.83 \times 10^{-5} \text{ M}$$





I	0.92	0	0
C	-2x	+2x	x
E	0.92-2x	2x	x

$$K = \frac{[\text{CO}]^2 [\text{O}_2]}{[\text{CO}_2]^2} \quad 2.0 \times 10^{-6} = \frac{[2x]^2 [x]}{[0.92-2x]^2}$$

$$2.0 \times 10^{-6} = \frac{4x^3}{[0.92]^2}$$

$$0.92 - 2x \doteq 0.92$$

100 Rule.

$$x = 7.51 \times 10^{-3} \text{ M.}$$

$$[\text{CO}] = 2 \times 7.51 \times 10^{-3} \text{ M}$$

$$= \boxed{0.015 \text{ M}}$$



I	<del>X</del>	0	0
C	<del>X</del>	+x	+x
E	<del>X</del>	x	x

$$x = 2.3 \times 10^{-3}$$

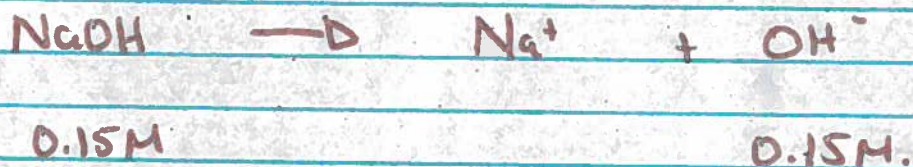
$$K_{sp} = [\text{Mg}^{2+}] [\text{CO}_3^{2-}]$$

$$= [2.3 \times 10^{-3}] [2.3 \times 10^{-3}]$$

$$= \boxed{5.29 \times 10^{-6}}$$



16. NaOH = strong base.



$$\text{pOH} = 0.082$$

$$[\text{OH}^-] = 0.15 \text{ M}$$

$$\text{pH} = 13.17$$

$$[\text{H}_3\text{O}^+] = 6.667 \times 10^{-14}$$



I	15.0M
C	-x
E	15-x



0	0
+x	+x
x	x

$$K = \frac{[\text{NH}_4^+][\text{OH}^-]}{[\text{NH}_3]} \quad 1.8 \times 10^{-5} = \frac{x^2}{[15-x]}$$

$$1.8 \times 10^{-5} = \frac{x^2}{15}$$

$$15-x \approx 15$$

100 rule.

$$x = 0.01643$$

$$[\text{OH}^-] = 0.01643 \text{ M}$$

$$\text{pOH} = 1.784$$

$$[\text{H}_3\text{O}^+] = 6.09 \times 10^{-13} \text{ M}$$

$$\text{pH} = 12.21$$



18)



$$K = \frac{[\text{H}^+][\text{F}^-]}{[\text{HF}]}$$

$$6.6 \times 10^{-4} = \frac{x^2}{0.25-x}$$

$$0.25-x = 0.25$$

100% error

$$6.6 \times 10^{-4} = \frac{x^2}{0.25}$$

$$x = 0.0128 \text{ M}$$

$$[\text{H}_3\text{O}^+] = 0.0128 \text{ M}$$

$$\text{pH} = 1.89$$

$$[\text{OH}^-] = 7.78 \times 10^{-13} \text{ M}$$

$$\text{pOH} = 12.1$$