1999 Multiple Choice

(28.) Lattice energy $\frac{Q^2}{d}$; Mg forms a +2 ion and O^{2-} is (1999)
more negatively charged ($O^{2-} > F^-$ as far as size) (B.)

(30.) (D.) $\overset{+1}{H_2}\overset{-2}{Se} + 4\overset{+2}{O_2}\overset{-1}{F_2} \longrightarrow \overset{+6}{Se}\overset{-1}{F_6} + 2\overset{+1}{H}\overset{-1}{F} + 4\overset{0}{O_2}$

OX (Se: −2 → +6); RED (O: +2 → 0)

(31.) Not a very good question! (C.)

(32.) (D.) $-\overset{|}{\underset{|}{C_1}}-\overset{|}{C_2}=C_3\langle$ sp^2 hybridized around C_2 + C_3 ; sp^3 hybridized around C_1

(33.) $Ag^+ + Cl^- \longrightarrow Ag(Cl)$

.10 mol Cl^- (from NaCl) + .20 mol Cl^- from $CaCl_2$ so **.30 mol Cl^-**
requires .30 mole Ag^+ (C.)

(34.) $\underset{+3}{AlF_6^{3-}} + 3e^- \longrightarrow \underset{0}{Al} + \underset{-1}{6F^-}$ (RED) Cathode (A.)

(35.) $\frac{15\ \text{min}}{} \cdot \frac{60\ \text{sec}}{1\ \text{min}} \cdot \frac{C}{96{,}500\ \text{amp sec}} \cdot \frac{\text{mole } e^-}{1\ C} \cdot \frac{10\ \text{amp}}{1} \cdot \frac{1\ \text{mol Al}}{3\ \text{mole } e^-} \cdot \frac{27\ g}{1\ \text{mole Al}} =$ (C.)

(36.) Rate $= k\,[NO]^1[O_2]^2$ $\left(\frac{.40}{.10}\right)^x = \frac{8.0 \times 10^{-3}}{5.0 \times 10^{-4}}$; $4^x = \frac{80 \times 10^{-4}}{5.0 \times 10^{-4}}$

$4^x = 16$; $\boxed{x = 2}$ (B.)

(37.) Going from ~~Between~~ the third I.E. to the Fourth I.E. there is a huge jump in Energy Representing the removal of the 4th e⁻ so (C) Al !!

(47.) $\frac{62.2\ g\ Hf}{} \cdot \frac{\text{mole}}{178\ g} \cong \frac{.3}{.3}$ } $\frac{37.4\ g\ Cl}{} \cdot \frac{\text{mol}}{35.5\ g\ Cl} = \frac{1}{.3} = 3$

so $\boxed{HfCl_3}$ (C.)

(1999)

(48.) 100g → 1 ½ Life; 50g → 2nd ½ life; 25g → (13.5) 12.5g → 3rd ½ life. This Requires 24 days!!! (B.) So each requires about 8 days!!

(52.) Go with high Pressure & Low temp!!

(53.)

	W +	X →	Y +	Z	
[I]	1.2atm	1.6atm			
[Δ]	−.2	−.2	.2atm	.2atm	(A.)
Final [Eq]	1.0atm	1.4atm			

(54.) ∴ since this is Exothermic increasing will drive Rxn to left & Lower the Keq!

(55.) $HI + KMnO_4 + H_2SO_4 \rightarrow I_2 + 2MnSO_4 + K_2SO_4 + 8H_2O$

5.0 mole; 4.0 moles; 3.0 moles; 2.5 moles

(57.) $M^{3+} + 3e^- \rightarrow M(s)$ $E^\circ_{Red} = ???$

$Ag(s) \rightarrow Ag^+ + e^-$ $E^\circ_{ox} = -.80V$

$E_{total} = -2.46V$

(A) $-2.46 = -.80V + E^\circ_{Red}$

$E^\circ_{Red} = -1.66V$

(59.) $\frac{4\times10^{-2}}{.040L} \left| \frac{2.5\times10^{-1}\ OH^-}{L} \right| = (10\times10^{-3})$ + $(.0600L)\left(\frac{6\times10^{-2}}{3.0}\right)\left(\frac{3.0}{5\times10^{-1}}\right) = 18\times10^{-3}$ moles OH^-

$\frac{10\times10^{-3} + 18\times10^{-3}}{.100\ L} = \frac{28\times10^{-3}}{1\times10^{-1}} = 28\times10^{-2}M =$

(C.) .28M

(60.) $NH_4NO_3(s) \rightarrow N_2O(g) + 2H_2O(g)$

.03 mol; .03 mol; .060 mol

$PV = nRT$ $P = \frac{nRT}{V} = \frac{(.09mol)(.0821)(400) \div 1L}{9\times10^{-2}\quad 8\times10^{-2}\quad 4\times10^{2}}$

$\frac{72}{4}$ $= 288\times10^{-2}$

$\frac{}{28}$ $= 2.88\ atm$

(A) = 3atm

(61.) $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O(g) +$ [1323 kJ]

-1323 / $+2(-44)$ } -1323 / $+-88$ ← what if $2H_2O(\ell)$ instead? (1999)

-1411 (E.)

(62.) $HC_2H_3O_2(aq) + CN^-(aq) \rightleftharpoons HCN(aq) + C_2H_3O_2^-(aq)$

(A.) $K_{eq} = 3.7 \times 10^4$ so $HC_2H_3O_2 > HCN$ ✓ $CN^- > C_2H_3O_2^-$

($HC_2H_3O_2$: ↑ stronger acid; CN^-: ↑ stronger base)

(63.) $X + Y \rightarrow Z$ Rate $= [X]^1[Y]^0$ (B.)

(64.) the smaller the MWt the Faster the effusion ✓ P_{gas} ↓

(65.) $Mg(OH)_2(s) \rightleftharpoons Mg^{2+} + 2OH^-$ → Adding H^+ removes Base ✓ →

(66.) Heat + $NH_4Cl \rightleftharpoons NH_4^+ + Cl^-$ $\Delta H = +$ ✓ $\Delta S = +$

(67.) $8 \times 10^{-12} = 4x^3$; $x^3 = 2 \times 10^{-12}$; $x = [Ag_2CrO_4] = \sqrt[3]{2 \times 10^{-12}}$

$Ag_2CrO_4(s) \rightleftharpoons 2Ag^+ + CrO_4^{2-}$

(69.) $Ba^{2+} + SO_4^{2-} \rightarrow BaSO_4$

$\frac{.010 \text{ moles}}{.200 L}$ $\frac{.005 \text{ moles}}{.200 L}$ L.R.

So $\frac{.005 \text{ moles}}{.2 L}$ of Ba^{2+} Left (C.)

$\frac{5 \times 10^{-3} \text{ mole}}{2 \times 10^{-1} L} =$ [$2.5 \times 10^{-2} M$]

$= .025 M$

(70.) $3Ag^+ + PO_4^{3-} \rightarrow Ag_3PO_4$

$\frac{.01 \text{ mole}}{.2 L}$ $\frac{.01 \text{ moles}}{.2 L}$

$\frac{.01 \text{ moles}}{.2 L} \left| \frac{\text{mol } NO_3^-}{3 \text{ mol } AgNO_3} \right| =$

$Na_3PO_4 + 3AgNO_3 \rightarrow Ag_3PO_4 + 3NaNO_3$

$\frac{.01 \text{ mol}}{.2 L}$ $\frac{.01 \text{ moles}}{.2 L}$ $\frac{.0033 \text{ moles}}{2 L}$ $\frac{.01 \text{ mole}}{.2 L}$

.003 mole react

Forms ppt

spectator!

$\frac{.01 \text{ moles}}{.2 L} \left| \frac{3 \text{ mol } Na^+}{1 \text{ mol}} \right|$

(A.) $[PO_4^{3-}] < [NO_3^-] < [Na^+]$ greatest

(71.) Add HCl to precipitate the Pb^{2+} ions! (B.) (1999)

(72.) hydrate $\xrightarrow{(Heat)}$ (anhydrous salt) + H_2O

(B.)

62% 38%

49% 51% Correct value

* Since the measured ~~salt~~ salt after heating was 62% there must have been some water with the salt. In other words the hydrate was not heated long enough

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(73.) $(10.0mL)(6.00M) = (.500M)V_2$; $V_2 = \frac{60}{.5} = \frac{600}{5} = 120mL$

So 110mL must be added to the 10mL to equal (D.)

(74.) Look for the substance w/ the greatest MWt (A)

(75.) Look for Liquids w/ similar IM forces (D.)
