Practice test 2 Key

1) a
2) a
3) b
4) c
5) a
6) b
7) a
8) e
9) d
10) c

1 a) $Mg(g) + IE_1 \longrightarrow Mg^+(g) + e^-$

or $Mg(g) \longrightarrow Mg^+(g) + e^-$

b) Each IE takes one e^-. After the second IE (IE_2) you have removed both valence electrons from Mg. IE_3 is the energy required to take a 3rd electron from Mg which is from its closed (stable) core.

c) 738 kJ/mol

$$\frac{738\,kJ}{1\,mol}\left(\frac{10^3\,J}{1\,kJ}\right)\left(\frac{1\,mol}{6.022\times10^{23}}\right) = 1.226\times10^{-18}\,J$$

$$E = \frac{h\cdot c}{\lambda} \Rightarrow \lambda = \frac{h\cdot c}{E} = \boxed{1.62\times10^{-7}\,m}$$

or $\boxed{162\,nm}$

2 $\frac{1}{\lambda} = R\left(\frac{1}{m^2} - \frac{1}{n^2}\right)$

$$\frac{1}{4652.84\,nm} = 1.097\times10^{-2}\,nm^{-1}\left(\frac{1}{m^2} - \frac{1}{7^2}\right)$$

$$\frac{1}{m^2} = .04$$

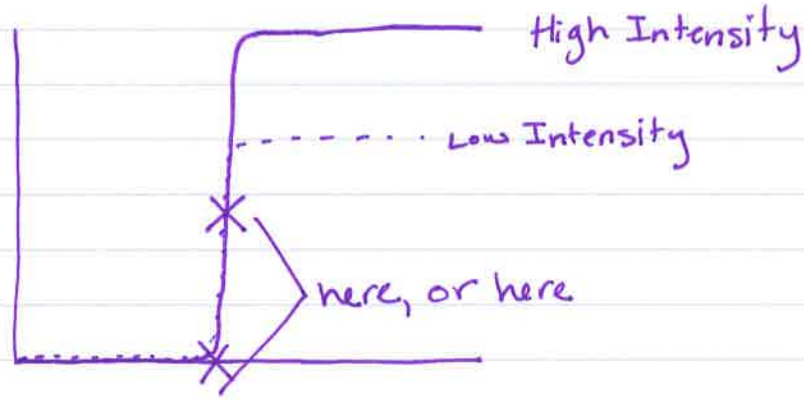
$\boxed{m = 5}$

Short Answer

1 a) Pb^{4+} : $[Xe]\,5d^{10}4f^{14}$

b) Ir : $[Xe]\,6s^{2}5d^{7}4f^{14}$

2) a) + b)



c) The extra energy is converted to kinetic energy in the e^-. So, the extra energy will go toward the velocity of the e^- as it is ejected.

3) a) Kr Rb Se^{2-} [Sr^{2+}]

these 3 are isoelectronic, so most protons means smallest

Just using trend makes you know Kr is smaller than Rb

b) [Cl] Ru I Cs

Just trend alone here.

4) Be has a full s-subshell which is stable. This stability causes it to require more energy to remove than ~~B~~ the p-electron of B despite the trend.

5) a) [F] S Br Zn

b) Si P [N] C

6) $Ne(g) + e^- \longrightarrow Ne^-(g)$

Because you are having to begin filling a new shell in order to add $1e^-$.

Naming

a) diphosphorus pentasulfide
b) HF (aq)
c) lithium sulfide
d) chromium (III) phosphate
e) $Mn(C_2H_3O_2)_2$

Problems

1) $23.7g\ K_3PO_4 \left(\frac{1\,mol\,K_3PO_4}{212.27g\,K_3PO_4}\right)\left(\frac{3\,mol\,K}{1\,mol\,K_3PO_4}\right)\left(\frac{39.10g\,K}{1\,mol\,K}\right)$

$= \boxed{13.1g\ K}$

2) $12.465 g\ CO_2 \left(\frac{1 mol\ CO_2}{44.01 g\ CO_2}\right)\left(\frac{1 mol\ C}{1 mol\ CO_2}\right) = .2832 mol\ C$ *

$7.656 g\ H_2O \left(\frac{1 mol\ H_2O}{18.02 g\ H_2O}\right)\left(\frac{2 mol\ H}{1 mol\ H_2O}\right) = .8497 mol\ H$ *

$.2832 mol\ C \left(\frac{12.01 g\ C}{1 mol\ C}\right) = 3.4016 g\ C$

$.8497 mol\ H \left(\frac{1.01 g\ H}{1 mol\ H}\right) = .858197 g\ H$

$14.300 g\ sample - 3.4016 g\ C - .858197 g\ H$
$= 10.04 g\ Cl$

$10.04 g\ Cl \left(\frac{1 mol\ Cl}{35.45 g\ Cl}\right) = .2832 mol\ Cl$ *

$C_{\frac{.2832}{.2832}} H_{\frac{.8497}{.2832}} Cl_{\frac{.2832}{.2832}}$

$C_1 H_3 Cl_1 \Rightarrow \boxed{CH_3Cl}$