

Define the following:

Effective Nuclear Charge	Ionization Energy	Electron Affinity

- 1) Place the following in order of increasing atomic radius: **As** **O** **Br**
 A) $As < O < Br$ B) $O < As < Br$ C) $Br < As < O$ D) $As < Br < O$ E) $O < Br < As$

What factor(s) could contribute to the trend in atomic radius?

- 2) Place the following in order of increasing radius: **Ca²⁺** **S²⁻** **Cl⁻**
 A) $Cl^- < Ca^{2+} < S^{2-}$ B) $Ca^{2+} < Cl^- < S^{2-}$ C) $Ca^{2+} < S^{2-} < Cl^-$ D) $Cl^- < S^{2-} < Ca^{2+}$ E) $S^{2-} < Cl^- < Ca^{2+}$

What factor(s) could contribute to the trend in atomic radius in ions? (Hint: look at the proton/electron ratio)

- 3) Place the following in order of increasing IE_1 : **N** **F** **As**
 A) $F < N < As$ B) $As < N < F$ C) $As < F < N$ D) $N < As < F$ E) $F < As < N$

What factor(s) could contribute to the trend in ionization energy?

- 4) Place the following in order of increasing EA. **N** **F** **As**
 A) $F < N < As$ B) $As < N < F$ C) $N < As < F$ D) $F < As < N$ E) $As < F < N$

What factor(s) could contribute to the trend in electron affinity?

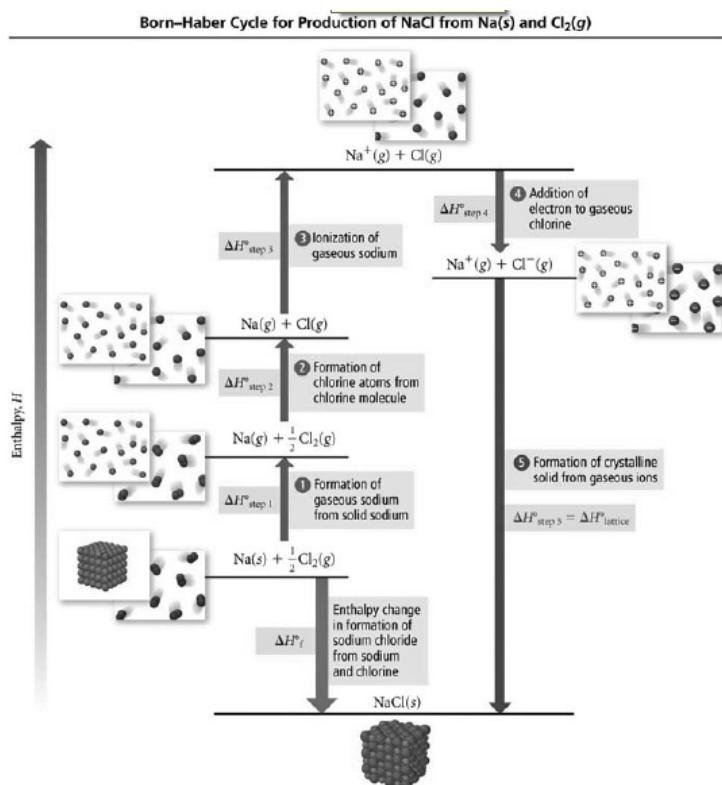
Determine the magnetic properties of the following atoms and ions: List the number of unpaired electrons for those that are paramagnetic (use orbital box notation to help).

Ca: Paramagnetic or diamagnetic (circle one) # of unpaired electrons _____

P: Paramagnetic or diamagnetic (circle one) # of unpaired electrons _____

O²⁻: Paramagnetic or diamagnetic (circle one) # of unpaired electrons _____

Zn²⁺: Paramagnetic or diamagnetic (circle one) # of unpaired electrons _____



Born-Haber cycle for lattice energy of NaCl: Each step adds up in a Hess's Law problem, which relates the enthalpy of formation to the lattice energy of the salt

Step (1) ΔH of sublimation for Na(g)

Step (2) ΔH of formation for Cl(g)

Step (3) IE for Na(g)

Step (4) EA for Cl(g)

Step (5) ΔH of lattice for the salt

$$\Delta H_f = \Delta H_1 + \Delta H_2 + \Delta H_3 + \Delta H_4 + \Delta H_5$$

Use the Born-Haber cycle to determine the enthalpy of formation of KCl. Label or write each step in the process and discuss what each step represents in your group. Then, indicate if the process is endothermic or exothermic. **NOTE: Steps are **NOT** in order!!

		ΔH° (kJ)	Circle one
_____	K(s) \rightarrow K(g)	89	endo/exo
Step 3: Ionization Energy for K(g)	_____	418	endo/exo
Step 2: ΔH_f for Cl(g)	_____	244	endo/exo
_____	Cl(g) + e ⁻ \rightarrow Cl ⁻ (g)	-349	endo/exo
Step 5: $\Delta H_{lattice}$ for KCl(s)	_____	-717	endo/exo

Calculate the ΔH_f for KCl: