

## AP WORKSHEET 01GH: ANSWERS

1.

+1
+1
+3
-1
-2

2. The energy required to remove one mole of electrons from one mole of gaseous atoms



4. Be. Valence electron closer to the nucleus (in the second shell as opposed to the fourth) with less shielding from inner electrons, so the Coulombic (electrostatic) attraction is greater in Be than in Ca

Ar. Shielding is constant across the period, Argon has more protons that attract the electrons to a greater extent because of increase Coulombic (electrostatic) attraction

5. (a) 13

(b)  $\text{AF}_3$

(c) 5

6.  $\text{Y}^{3+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Rb}^+$ , Kr, Br,  $\text{Se}^{2-}$

7. All of them. Second electrons are being removed from a now, positive species. If the second electron is being removed from the same quantum shell as the first electron, then the electrons will now experience slightly less mutual repulsion and may be able to get slightly closer to the nucleus thus experiencing a greater Coulombic (electrostatic) attraction. If the second electron is being removed from an inner quantum shell, closer to the nucleus, then it will experience a significantly greater Coulombic (electrostatic) attraction from the nucleus and be significantly more difficult to remove.

8. No. None
9. Yes.  $S^{2-}$  and  $Cl^-$ . (*many other possible answers*)
10. The energy change when one mole of electrons is gained by one mole of gaseous atoms to produce one mole of gaseous ions
11.  $O^-(g) + e^- \rightarrow O^{2-}(g)$
12. (a) 2
- (b) The large increase in ionization energy between the second and the third values suggests that the third electron is in an inner quantum shell, closer to the nucleus with less shielding and therefore experiences a greater attraction from the nucleus. This suggests that the first two electrons are in an outer shell, i.e., group 2
- (c)  $XBr_2$
13. The second ionization energy of Rubidium is very high since its second electron is closer to the nucleus in inner quantum shell with less shielding. This means that the energy required to remove the second electron is less likely to be compensated by subsequent exothermic processes
14. They have similar outer electronic configurations. Outer electronic configurations are what determine chemical reactivity
15. 210 K (*range of values acceptable*)
16. Hydrogen ion smaller, hydride ion bigger
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18.  $Sc^{3+}$  and  $Ca^{2+}$ ,  $F^-$  and  $Al^{3+}$ ,  $Cu^+$  and  $Zn^{2+}$ ,  $Fe^{2+}$  and  $Co^{3+}$
19. Yes.  $K^+$  and  $Ca^{2+}$  (*many other possible answers*)
20. Cs, Sr, As, S, F

