

## AP WORKSHEET 01GH: Periodicity Summary

1. Complete the table. (5)

Element	Charge on its most common ion
Rb	
Cs	
Ga	
At	
Se	

2. Define, 'First Ionization Energy'. (2)

3. Using the metal magnesium as an example, write **two separate** equations to show the first and second ionization energy of magnesium. (Remember state symbols are important as they form part of the definition). (4)

First Ionization

<sup>33</sup>As <sup>34</sup>Se

Second Ionization

<sup>53</sup>I

4. Which of the following elements (one from each pair) would you expect to have the highest first ionization energy? Explain your answers. (4)

Ca or Be

Na or Ar

5. Consider the table of the first four ionization energies for element A shown below.

Ionization Energy in $\text{kJ mol}^{-1}$	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
	578	1817	2745	11580

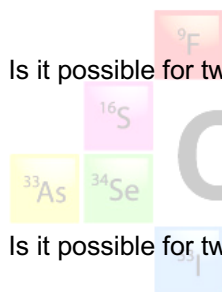
- (a) In which group does A appear on the periodic table? (1)
- (b) Predict the formula of the compound that A forms with fluorine. (1)
- (c) What is the minimum number of electrons that A must have? (1)
6. Arrange the following species in order of **increasing** size.  $\text{Rb}^+$ ,  $\text{Y}^{3+}$ ,  $\text{Br}^-$ ,  $\text{Kr}$ ,  $\text{Sr}^{2+}$  and  $\text{Se}^{2-}$ . (1)

**SMALLEST**

**LARGEST**

7. Are there any atoms for which the second ionization energy is greater than the first? Explain your answer. (2)

8. Is it possible for two different **atoms** to be isoelectronic? If so give examples. (2)



Chemistry Pages

9. Is it possible for two different **anions** to be isoelectronic? If so give examples. (2)

10. Define, 'First Electron Affinity'. (2)

11. Write an equation to summarize the process of **second** electron affinity of oxygen. (Remember state symbols are important as they form part of the definition). (2)

12. Consider the table of ionization energies for element X shown below.

Ionization Energy in kJ/mol	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>
	737	1450	7732	10540	13360	17995

- (a) In which group will X be found? (1)
- (b) Explain your answer to 12(a). (2)
- (c) Predict the formula of X's bromide. (1)

13. Explain carefully why rubidium tends only to form a +1 ion? (2)

14. Explain carefully why elements in the same group undergo similar chemical reactions. (1)



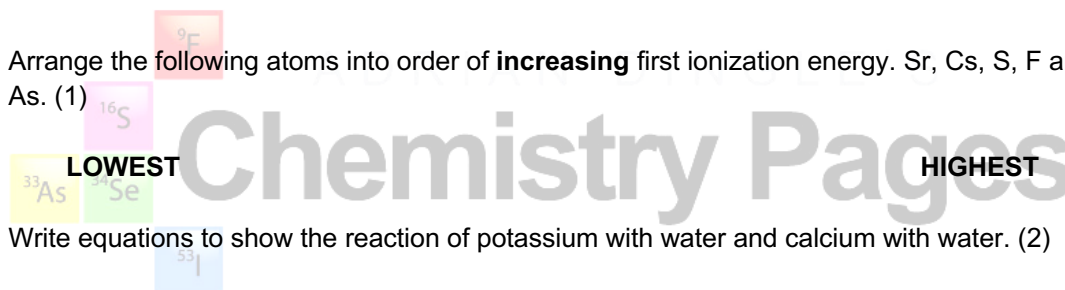
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15. Use the data below in order to predict the boiling point of radon. (1)

Noble gas	Boiling Point in K
Helium	4.21
Neon	27.1
Argon	87.3
Krypton	120.
Xenon	165

16. How would expect the sizes of the hydrogen ion and the hydride ion to compare with that of the hydrogen atom? Explain. (3)
17. How would expect the sizes of the hydrogen ion and the hydride ion to compare with that of the helium atom? Explain. (3)
18. Identify any (and all) isoelectronic species in the following list;  $\text{Fe}^{2+}$ ,  $\text{Sc}^{3+}$ ,  $\text{Ca}^{2+}$ ,  $\text{F}^-$ ,  $\text{Co}^{2+}$ ,  $\text{Co}^{3+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Cu}^+$ ,  $\text{Zn}^{2+}$  and  $\text{Al}^{3+}$ . (4)
19. Is it possible for two different **cations** to be isoelectronic? If so give examples. (2)

20. Arrange the following atoms into order of **increasing** first ionization energy. Sr, Cs, S, F and As. (1)



21. Write equations to show the reaction of potassium with water and calcium with water. (2)
22. Write equations to illustrate the following. (3)
- The basic nature of rubidium oxide.
  - The acidic nature of an oxide of phosphorus.
  - The reaction of calcium oxide with water.