

Phys Sc 436  
Test 1.3

Name \_\_\_\_\_

1. Complete the following table:

Isotope Notation	Shell Diagram	Valence Number
$^{23}\text{Na}$		
$^{27}\text{Al}^{+3}$		
$^2\text{H}^{-1}$		
$^{40}\text{Ar}$		

(10 marks)

2. (436 only) Give two elements (charged or uncharged) that have the same shell diagram as  $\text{F}^{-1}$ . (In other words they have to be *isoelectronic*.)

(2 marks)

3. Which **3** of the following elements would you place in the same family, based on their properties?

Element	Melting Point( $^{\circ}\text{C}$ )	Common Ion(s)	Conducts electricity?	appearance
622	29	+1	yes	Grey, shiny
623	1536	+2,3	yes	Grey, shiny
624	2500	+2,3,4	yes	Grey, shiny
625	-7.2	-1	no	brown liquid
626	3000	+2,3,4,6,8	yes	Grey, shiny
627	961	+1	yes	Grey, shiny

Answer \_\_\_\_\_

(2 marks)

4. What is the common ion for alkaline earth metals and why?

(2 marks)

5. Explain why there is no neutral calcium in nature.

(2 marks)



6. List two *distinguishing* physical properties of alkali metals and two other physical properties.

(4 marks)

distinguishing(characteristic) = (1) \_\_\_\_\_

(2) \_\_\_\_\_

other properties

(3) \_\_\_\_\_

(4) \_\_\_\_\_

7. Write an equation showing the reaction between sodium and water, given the reaction between lithium and water:



(1 mark)

8. Give a reason why would it be a bad idea to throw large amounts of calcium down the drain.

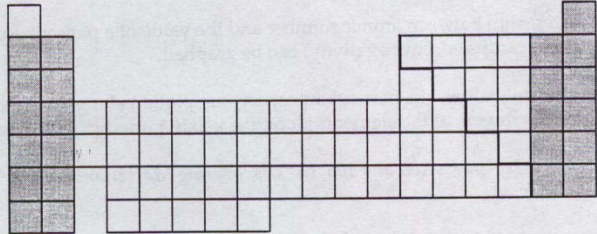
(2 marks)

9. Show what happens when Na becomes  $\text{Na}^{+1}$  using two shell diagrams.  
*(1 mark)*
10. What family of elements reacts with both alkali metals and alkaline earth metals?  
*(1 mark)*
11. Why are Ca, Mg etc. called alkaline **earth** metals? Why on earth "earth"?  
*(1 mark)*
12. Explain why F loves to react with another F to form  $\text{F}_2$ . Use dot and shell diagrams in your explanation.  
*(3 marks)*
13. When molten sodium is added to chlorine, a flash occurs and a white powder is left behind. Explain what happened by mentioning electrons.  
*(3 marks)*
14. The noble gases don't react with alkali metals. How come?  
*(1 mark)*
15. What element am I? For each of the following indicate the element that is being described. (1 mark each)
- I'm in the same column as Rb, but I'm not part of his family\_\_\_\_\_
  - I have electrons in two different energy levels(shells) and my last shell is full\_\_\_\_
  - My mass number is 28 and I have 14 neutrons\_\_\_\_
  - I react vigorously with water and the charge of my *nucleus only* is +19\_\_\_\_\_
  - I'm in the second **period** (not the hockey period, not a girl's period, not a period of history, not the period in the sentence---the second *shell*), and I have 5 valence electrons\_\_\_\_\_
  - I'm a brown, liquid halogen\_\_\_\_\_

- g. I'm the most common (-1) ion in the ocean\_\_\_\_\_
- h. I burn with a dazzling white flash to produce a (+2)containing compound or ash\_\_\_\_\_
- i. I'm the noble gas in little kids'--or big kids' balloons\_\_\_\_\_
- j. I'm a very soft metal with less protons than neon\_\_\_\_\_

16. Multiple Choice:( 2marks)

From left to right, what names are given to the shaded columns in the periodic table ?



- a) alkali metals, alkaline earth metals, halogens, inert gases
- b) inert gases, alkaline earth metals, alkali metals, halogens
- c) halogens, alkaline earth metals, alkali metals, inert gases
- d) halogens, alkali metals, inert gases, alkaline earth metals

17. Answer **both** multiple choice questions:

Which of the following is the electron configuration of an alkali metal?

- a) ● ) ) )  
2e- 8e- 7e-
- b) ● ) ) )  
2e- 8e- 8e-
- c) ● ) )  
2e- 4e-
- d) ● ) ) )  
2e- 8e- 1e-

Which of the following represents the electron configuration of a halogen?

- a) ● ) ) )  
2e- 8e- 7e-
- b) ● ) ) )  
2e- 8e- 8e-
- c) ● ) )  
2e- 4e-
- d) ● ) ) )  
2e- 8e- 1e-

(2 marks each = 4)

18. **Fill in the blanks. (1 mark each)**

- a. If a gas sample pops when it is lit, and it leaves water behind, the gas is probably \_\_\_\_\_.
- b. Limewater from the calcium-water reaction can be filtered and then rendered cloudy by reacting it with \_\_\_\_\_ gas.
- c. Calcium chloride paper turns pink whenever a mixture that comes in contact with it contains \_\_\_\_\_.
- d. The model that followed Rutherford was the work of the Danish scientist \_\_\_\_\_.
- e.

The plum pudding model that equally distributes positive and negative charges was proposed by \_\_\_\_\_ (his picture is included to the right for those of you who collect such rare items.)



gold foil but which occasionally bounced back were known as \_\_\_\_\_ particles.

- f. In Rutherford's experiment, the particles that, for the most part, went right through the
- g. Beta radiation or cathode rays are a part of the atom discovered by Thomson. We usually call these \_\_\_\_\_
- h. In Bohr's model, an electron occupies energy levels that resemble planetary \_\_\_\_\_

19. Is the change **chemical**? Or **physical**? (1 mark each)

- a. the reaction between sodium and water \_\_\_\_\_
- b. letting gallium melt in your hand \_\_\_\_\_
- c. the growth of a flower \_\_\_\_\_
- d. calcium losing two electrons to chlorine to become calcium ion \_\_\_\_\_

20. Give one *physical* characteristic property of water. (1 mark)

21. Give an example of an isotope pair. (2 marks)