

## Lab 2b Chemistry lab

Name \_\_\_\_\_

Seat number \_\_\_\_\_

### Objectives:

1. Carbon
2. Ionic bonds
3. Covalent bonds
4. Questions

### A. Carbon

1) Carbon has an atomic number of 6 and atomic mass of 12.

- a) How many protons does C have? \_\_\_\_\_
- b) How many electrons does C have? \_\_\_\_\_
- c) How many neutrons does C have? \_\_\_\_\_
- d) Draw a Bohr diagram of C and show the electrons in its shells.

C
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2) Carbon-14 ( $^{14}\text{C}$ ) has an atomic number of 6 and an atomic mass of 14.

- a) What subatomic particle does it have more of? a \_\_\_\_\_
- b) How many are there? \_\_\_\_\_
- c) What do we call it when an atom has more of these? \_\_\_\_\_
- d) Name one use of  $^{14}\text{C}$  \_\_\_\_\_

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### B. Ionic bonds

1) Sodium (Na) has an atomic number of 11 and an atomic mass of 23.

- a) How many protons does Na have? \_\_\_\_
- b) How many electrons does Na have? \_\_\_\_
- c) How many electrons go into the...
  - i) first shell? \_\_\_\_
  - ii) second shell? \_\_\_\_
  - iii) third shell? \_\_\_\_

Na

d) Draw a Bohr diagram of Na and show the electrons in its shells.

2) We know that Na requires eight electrons (octet rule) in its valence shell to become stable.

- a) But how many electrons does it have in this outer shell? \_\_\_\_
- b) So, Na can try to get 7 more electrons or give one away. Which would be easier? \_\_\_\_\_

Na ion

- c) Na cannot change its proton number or it wouldn't be Na any longer. But it can change its electron number and when it does this it becomes an ion. Na, the ion (not the atom) will now have \_\_\_\_ protons and \_\_\_\_ electrons.
- d) The protons have a (+) (positive) charge and the electrons have a (-) (negative) charge. So, ionic Na has \_\_\_\_ (+) charges and \_\_\_\_ (-) charges with a net charge of \_\_\_\_.
- e) Draw Bohr a diagram of Na ion and show the electrons in its shells.

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3) Chlorine (Cl) has an atomic number of 17 and an atomic mass of 35.

- a) How many protons does Cl have? \_\_\_\_
- b) How many electrons does Cl have? \_\_\_\_
- c) How many electrons go into the...
  - i) first shell? \_\_\_\_
  - ii) second shell? \_\_\_\_
  - iii) third shell? \_\_\_\_
- d) Draw a Bohr diagram of Cl and show the electrons in its shells.

Cl

4) We know that Cl requires eight electrons (octet rule) in its valence shell to become stable.

- a) But how many electrons does it have in this outer shell? \_\_\_\_
- b) So, Cl can try to get 1 more electron or give away 7. Which would be easier? \_\_\_\_\_

Cl ion

- c) Cl cannot change its proton number or it wouldn't be Cl any longer. But it can change its electron number and when it does this it becomes an ion. Cl, the ion (not the atom) will now have \_\_\_\_ protons and \_\_\_\_ electrons.
- d) The protons have a (+) (positive) charge and the electrons have a (-) (negative) charge. So, ionic Cl has \_\_\_\_ (+) charges and \_\_\_\_ (-) charges with a net charge of \_\_\_\_.
- e) Draw a Bohr diagram of a Cl ion and show the electrons in its shells.

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- 5) An ionic bond forms when 2 ions like Na and Cl give and take their electrons and form NaCl, table salt. Now draw NaCl using colored pencils. Draw all the electrons that were originally from Na in BLUE and all the electrons that were originally from Cl in RED.



- 6) Circle one
- a) We call ionic Na a (cation | anion).
  - b) We call ionic Cl a (cation | anion).

### C. Covalent bonds

- 1) Hydrogen (H) has an atomic number of 1 and atomic mass of 1.
- a) Hydrogen has how many...
    - i) protons? \_\_\_\_
    - ii) electrons? \_\_\_\_
    - iii) neutrons? \_\_\_\_
  - b) How many electrons go into hydrogen's first shell? \_\_\_\_
  - c) How many more electrons would H require to fill up the first shell? \_\_\_\_
- 2) Oxygen (O) has an atomic number of 8 and an atomic mass of 16.

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- a) Oxygen has how many...
- i) protons? \_\_\_\_
  - ii) electrons? \_\_\_\_
  - iii) neutrons? \_\_\_\_
- b) How many electrons go in the...
- i) first shell? \_\_\_\_
  - ii) second shell? \_\_\_\_
- c) How many more electrons would O require to fill up its second shell? \_\_\_\_
- 3) O and H will not give up or take electrons, but they will share them. The bond they share will be called a covalent bond but it is a polar covalent bond because the electrons will spend more time around O than H.
- a) O has a partial \_\_\_\_ charge and
  - b) H has a partial \_\_\_\_ charge due to this unequal sharing of these electrons.
  - c) Nonpolar covalent bonds are formed when there is equal sharing of electrons. The electrons spend fairly equal time around all atoms.
  - d) Name 2 molecules that have nonpolar covalent bonds.
    - i) \_\_\_\_\_
    - ii) \_\_\_\_\_