LEARNING AS ONE NATION

Expanded Project

SHS LEARNING ACTIVITY

Name: _____ **Score/Mark:** _____

Grade and Section: _____ **Date:** _____

Strand: ☐ STEM ☐ ABM ☐ HUMSS ☐ ICT (*TVL Track*)

Subject: *Physical Science (Chemistry)*

Type of Activity: ☑ Concept Notes ☑ Skills: Exercise/Drill ☐ Illustration ☐ Performance Task ☐ Essay/Report ☐ Others: _____

Activity Title: **LA09: Molecular Polarity**

Learning Targets:
1) To determine if a molecule is polar or non-polar given its molecular structure.
2) To relate the polarity of a molecule to its properties.

References: *(Author, Title, Pages)*
1) Bruice, P. Y. (2011). *Organic Chemistry*, 6th edition, pp. 29–30;
2) Sadudaquil, J. A. *CVIF–DLP Learning Activities*

Factors to consider in determination of molecular polarity:

1) **Bond polarity** (**LA07**) due to differences in electronegativity (**LA06**)
2) Over-all **molecular geometry** (**LA08**), which can be simplified using the VSEPR model or by drawing the Lewis electron dot structure

Some basic generalizations of molecular polarity of compounds:

1) Ionic compounds – **polar** over-all
   Example: $MgCl_2$ (magnesium chloride)
2) Covalent compounds:
   a) Symmetric compounds – central atom has no lone pair of electrons
      i) Central atom is surrounded by equal number of same neighboring atoms
         – **nonpolar** due to the net cancellation of the dipoles
         (if we treat dipoles as vectors. 💡Recall vectors in JHS Physics!💡)
         Example: CCl_4 (carbon tetrachloride)
      ii) Linear heterodiatomic (two different atom) molecules – **polar**
         Example: HCl (hydrochloric acid)
   b) Unsymmetric or Asymmetric compounds – central atom has at least one lone pair of electrons
      – can either be **polar** or **nonpolar**
         Example: H_2O (water) is polar while $C_{12}H_{24}O_2$ (lauric acid) is nonpolar
      – As the number of atoms bonded gets higher (the chain of central atoms is longer and not only one!), molecular polarity now involves other factors, such as the presence of **functional groups** and **charges**.

Molecular polarity clearly manifests in its application in **solubility**. As a general rule, compounds with the **same polarity can easily mix**.

1) Majority of salts, acids, bases, and short chain organic compounds, which are polar, are soluble in the well-known universal solvent – water!
2) Fluid products (such as shampoos and lotions) contain a certain combination of polar (usually water and short chain alcohols like ethanol) and nonpolar solvents to dissolve the polar and nonpolar constituents of the said product.

Exercise:

From the different molecules you have encountered in this and previous learning activities, give one and tell whether it is polar or non-polar. Explain why.