

Sniffing It Out

Phase, Size, Polarity, and Smell

Name _____

Date _____ Period _____

Purpose

To analyze data that relate the size of molecules, type of bonding, phase, and polarity to smell.

Instructions

In this data table, substances that have no smell are shaded gray. Use the data table to answer the questions. In general, molecules with around 5 to 19 carbon atoms are considered medium-size.

Substance type and bonding	Size	Smell?	Phase	Examples	
				Name	Formula
Molecular Nonpolar covalent	small molecules	no	gas	nitrogen oxygen carbon dioxide methane	N ₂ O ₂ CO ₂ CH ₄
Molecular Polar covalent	small molecules	yes	gas	hydrogen chloride hydrogen sulfide ammonia fluoromethane	HCl H ₂ S NH ₃ CH ₃ F
Molecular Polar and nonpolar covalent	medium- size molecules	yes	liquid	octane geraniol carvone pentyl propionate	C ₈ H ₁₈ C ₁₀ H ₁₈ O C ₁₀ H ₁₄ O C ₈ H ₁₆ O ₂
Molecular covalent	large molecules	no	solid	1-triacontyl palmitate (beeswax) polystyrene cellulose	C ₄₆ H ₉₂ O ₂ C ₈₀₀₀ H ₈₀₀₀ C ₁₈₀₀ H ₃₀₀₀ O ₁₅₀₀
Ionic metals bonded to nonmetals	N/A	no	solid	sodium chloride (table salt) calcium oxide (lime) calcium carbonate (chalk)	NaCl CaO CaCO ₃
Metallic only metal atoms	N/A	no	solid	gold copper aluminum brass	Au Cu Al CuZn

Questions

1. Which types of gaseous molecules have a smell?
2. What types of molecules made from nonmetals have a smell?
3. Do nonpolar molecules have a smell?
4. If something is a solid, do you expect it to have a smell? How do you explain this?
5. If a substance contains a metal, do you expect it to have a smell? Explain.
6. Describe the types of substances that were in the vials in this unit.
7. Put an X in column 1 or 2, then complete the table.

Will smell	Won't smell	Example	Chemistry reasoning
			Metallic substance.
		epsom salts—magnesium sulfate, MgSO_4	
			Medium-size, covalent molecule. An alcohol.
		plastics, DNA, proteins, starch, paraffin, cellulose	
		sunflower oil, $\text{C}_{21}\text{H}_{38}\text{O}_5$	

- 8. Making Sense** In general, what kinds of substances have a smell?