

Activity 3

Name **KEY**

Matter, Properties and Changes

Introduction:

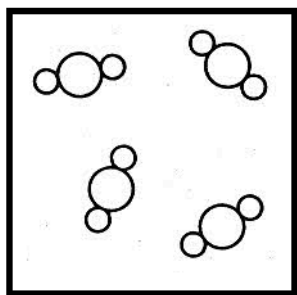
Elements are written with only single symbols, but may contain multiple atoms of the same element, while compounds contain two or more symbols or elements. Mixtures contain more than one pure substance either in a homogenous or heterogeneous mixture. The subscripts following a symbol of an element represent the number of that element present in the substance. **Which of the following substances are elements, compounds or mixtures?** State the number and name of each element present in the chemical formula.

1. Complete the following table.

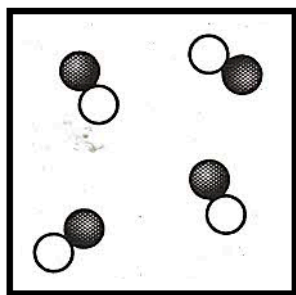
Substance	Substance or Mixture	Number and symbol of each element in substance
Ba	element	barium
NaF	Compound	1 Na (sodium) and 1 F (fluorine)
P ₄	element	phosphorus
CuSO ₄	Compound	copper, sulfur and 4 oxygen
Aqueous NaCl	homogeneous mixture	water (2 hydrogen and oxygen) sodium and chlorine
(NH ₄) ₃ PO ₄	Compound	4 nitrogen, 12 hydrogen; phosphorus and 4 oxygen
C ₆ H ₅ CH ₂ CH ₂ Cl	Compound	8 carbon, 9 hydrogen and chlorine
Oil and vinegar	heterogeneous mixture	

2. Substances, mixture and states of matter (gas, liquid and solid) can be represented on the atomic level. Organize the following diagrams to show the similarities of each group created.

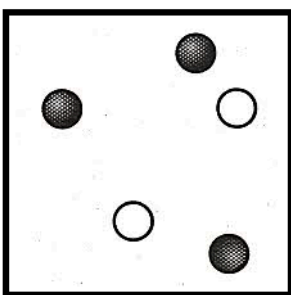
Group	Diagrams	Reason for Group
1	gases	a b c d f g o p s
2	liquids	h i m q r
3	solids	e k n t
4	changing state	j l
5	monatomic elements	c e h j k s
6	polyatomic elements	f m
7	compounds	a b i l n q r
8	pure substances	a b c e f h i j k l m n q r s
9	mixtures	c d g o p t



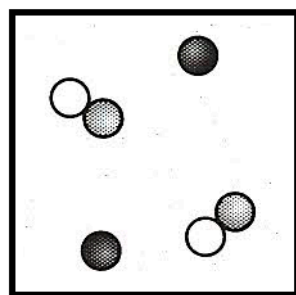
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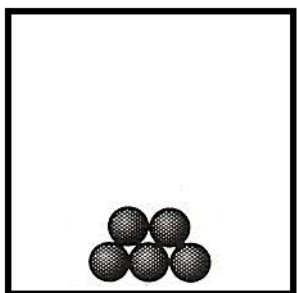
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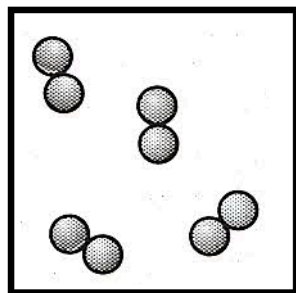
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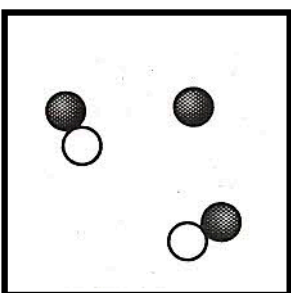
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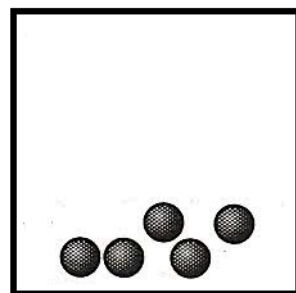
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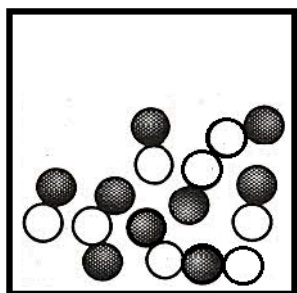
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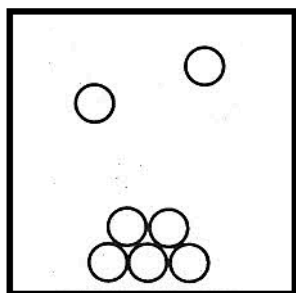
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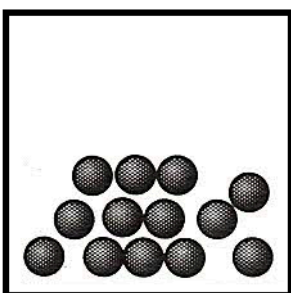
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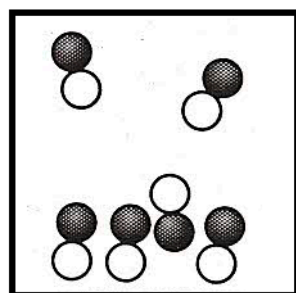
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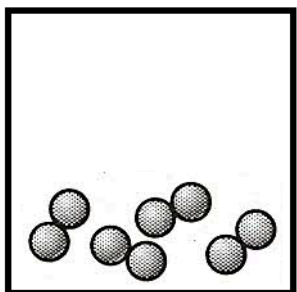
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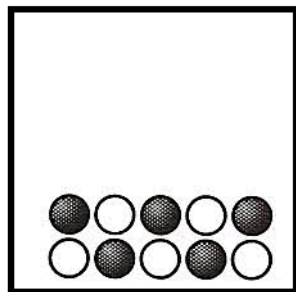
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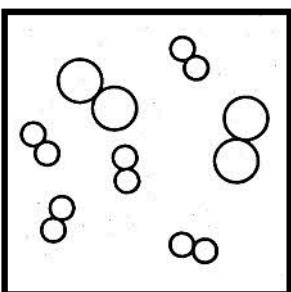
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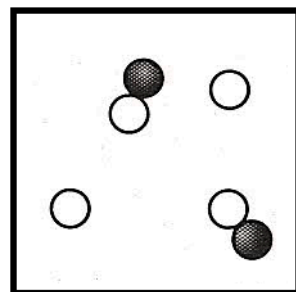
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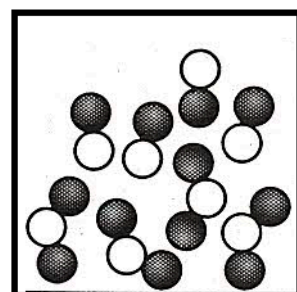
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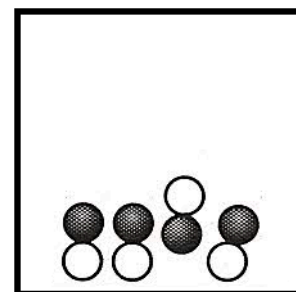
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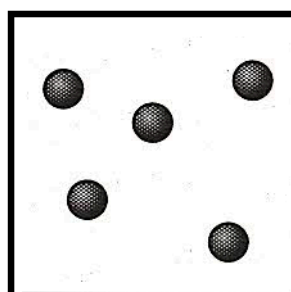
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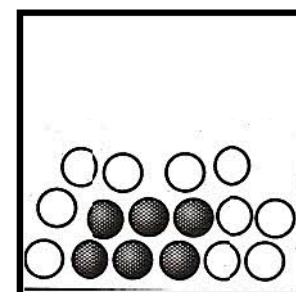
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When we are performing experiments, we often look for physical or chemical properties that can allow us to identify substances. We use density, solubility, state of matter, color or other physical properties. Some physical properties can be affected by outside changes. The melting point is the temperature at which a substance changes from a solid into a liquid. When the substance melts, a physical change occurs where the substance is still the same but its appearance has changed. Similarly, if we dissolve a compound such as table salt, NaCl, in water, the salt may have changed appearance, but it is still salt.

We can add chemical properties to help to identify the substance. Chemical properties describe how one substance interacts with another, for example, we say wood is combustible because it can burn easily; however, if we actually burn the wood, this is a chemical change or a chemical reaction. We can identify a chemical change because several observations indicate the change. The most common changes include a color change, which in itself may not indicate a reaction, but combined with a change in the temperature or a change in state of the matter, we can say that a reaction has probably occurred.

	Physical	Chemical
Change (Action)	New form of old substance. No new substances are formed.	Old substances are destroyed, new substances are formed
Property (Description)	Description by senses – shape, color, odor, etc. or Measurable properties – density, boiling point, etc.	List of chemical changes possible – description of a change. A chemical reaction.

2. Understanding the definitions, which of the following are physical properties (PP), physical changes (PC), chemical changes (CC) or chemical properties (CP)?

- hardness of diamond _____ physical property
- tarnishing of silver _____ chemical change
- color of litmus paper for determine Acid or base _____ physical property as color
- freezing water _____ physical change
- combustibility of paper _____ chemical property
- odor of ammonia _____ physical property
- grinding of pepper in a mill _____ physical change
- density of gold _____ physical property
- electrolysis of water _____ chemical property
- electrolyzing water to form hydrogen and oxygen gas _____ chemical change

Think about the following descriptions. If the materials are available, consider performing the action and carefully observe the changes that occur. Are the changes physical or chemical in nature? You can view these actions by video at http://online2.sdccd.edu/faculty/fgarces/Mov_Lib/Ch100/ChemPhyChange/zzCVP_Media/CVP_Media.htm#Demo. Do any of the actions involve physical change due to a chemical change? Explain the observations and evidence you use to conclude that the action is a chemical or physical change.

I generally give this part of the assignment as extra credit.

	Action	Observation and Evidence or Sign of Change	Chemical or Physical Change?
1	Lighting a match	flame; light, heat	chemical
2	Crushing a piece of chalk	smaller size	physical
3	Mixing vinegar with crushed chalk	bubbles	chemical
4	Mixing silver nitrate (AgNO_3) with table salt (NaCl)	precipitate - solid	chemical
5	Bending a light stick	if it begins to glow - then light; possible heat	chemical
6	Boiling water	bubbles; steam	physical
7	Crumpling paper	paper is smaller	physical
8	Adding Vinegar to baking soda	bubbles	chemical
9	crushing a crystal of rock candy (sugar)	smaller	physical
10	dissolving / recrystallizing sugar	dissappearance or reappearance of sugar	physical
11	Separating pigments by paper chromatography	separation of color	physical