During Class Invention #1

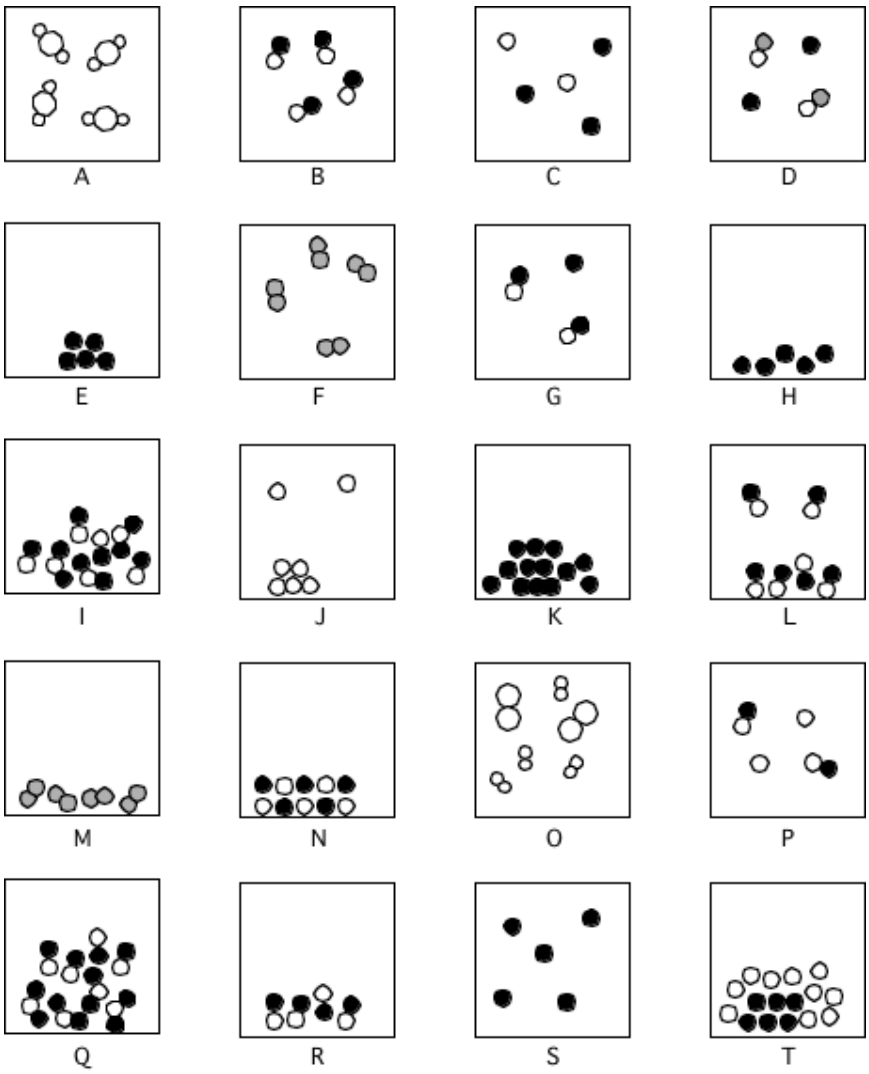
Name(s) with Lab section in Group

Classification of Matter

_____

_____

1. Each container[1] (A - T) shows a sample of substance(s) as viewed at the atomic level. Look at the containers and come up with some different ways to categorize the contents. For example, if you feel the contents of a subset of the containers could all be grouped, what would be the basis for the group?



Thoughts/ideas/comments:

[1] Inspired by James, Helen J. and Nelson, Samuel L. A Classroom Learning Cycle: Using Diagrams to Classify Matter. Journal of Chemical Education 58, 476, 1981.

2. Select one or more containers from 1 that represent:

a) a chemical change (briefly explain your reasoning for the choice)

C -→ G

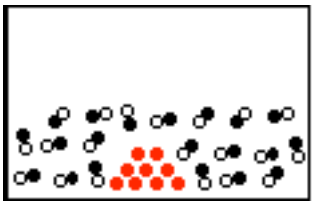
A chemical change, at the macroscopic level, is characterized by changes in color, the formation of a solid, or gas, and/or heat. At the particulate level all of these are difficult to detect. So at the particulate level we look for a redistribution of the atoms. Container N is a homogeneous mixture of two elements in the gas phase. The contents of Container K or D is a compound. The atoms have re-distributed themselves into a new molecular arrangement.

b) a physical change (briefly explain your reasoning for the choice)

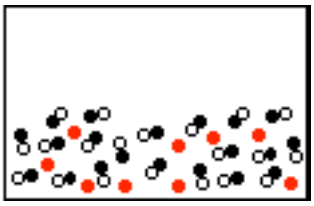
E →H →S and R →B and M→ F

Physical changes are characterized by changes in phase of a pure substance, or the formation of a mixture. No chemical change is observed. In all three Containers (H, I and M) the contents are the same. All three are the same substance, just different phases.

3. Complete the containers below by representing a solid substance in a liquid, before and after it dissolves. Include a brief narrative supporting your diagrams. Is dissolving a physical or chemical change?



Before



After

Dissolving is a physical change. All substances are the same in each container the only difference is the solid has been surrounded by the liquid particles and its organization has been broken down. No reaction has occurred. If we allowed the liquid to evaporate the solid would become organized again.

4. Describe the contents of four containers (below) that you have not selected for questions 2. Clearly describe the contents of the container such that the description fits that container and no other container.

Container	Elements/Compounds	Phase	Mixture/Pure Substance
A	**Compound**	**Gas**	**Pure substance**
B	**Compound**	**Gas**	**Pure Substance**

C	**Both are Elements (dark circle and light circle)**	**Gas**	**Homogeneous mixture**
D	**Element (dark circle) and compound (diatomic light and gray circles)**	**Both gases**	**Homogeneous mixture**
E	**Element (atoms)**	**Solid**	**Pure substance**
F	**Element (diatomic molecule)**	**Gas**	**Pure substance**
G	**Element (dark circle) and compound (diatomic light and gray circles)**	**Both gases**	**Homogeneous mixture**
H	**Element (monoatomic)**	**Liquid**	**Pure substance**
I	**Two compounds (diatomic molecule and a tri atomic molecule)**	**Liquid**	**Homogeneous mixture (solution)**
J	**Element**	**Solid and gas**	**Pure substance**
K	**Element**	**Solid and liquid**	**Pure substance**
L	**Compound**	**Liquid and gas**	**Pure substance**
M	**Element**	**Liquid**	**Pure substance**
N	**Two monoatomic elements (light and dark circles)**	**Solid**	**Homogeneous mixture (solution)**
O	**Two diatomic elements (small open circles and large open circles)**	**Both gas phase**	**Homogeneous mixture**
P	**Element (monoatomic light circle) and compound (diatomic light and dark circle)**	**Both gas phase**	**Homogeneous mixture**
Q	**Two compounds (diatomic molecule and a tri atomic molecule)**	**Both liquid phase (the diatomic compound is less dense than the triatomic compound)**	**Heterogeneous mixture**