

CHAPTER 2	Investigation 2.E: Properties of Substances Answer Key	BLM 2.3.5A
ANSWER KEY		

Answer to Analysis Question

1. Table 1. Properties of Unknown Substances

Unknown solid #	Name	Relative hardness (1–5, 5 is hardest)	Solubility in water	Solution conducts	Solid conducts	Relative melting point
1	paraffin	1	insoluble	—	no	melts first
2	sugar	4	soluble	no	no	melts second
3	quartz	5	insoluble	—	no	does not
4	salt	2	soluble	yes	no	does not
5	tin	3	insoluble	—	yes	melts third

Paraffin melts easily, is soft, insoluble, and does not conduct electricity. It must have the weakest intermolecular forces, so it is non-polar covalent.

Sugar is quite soft, does not increase conductivity of water in solution, and is soluble. It has intermolecular forces only slightly stronger than paraffin. Therefore, sugar is polar covalent.

Quartz is the hardest of the five substances, but does not melt, is insoluble, and does not conduct electricity. The intermolecular forces in quartz are the strongest of all five substances. Therefore, quartz is most likely a network solid.

Salt is also very hard and dissolves in water to form a conducting solution, but does not melt. The intermolecular forces that hold salt together must be the second strongest of the group. Salt is therefore an ionic crystal.

Tin is the third hardest substance in the group. It conducts electricity and also has a metallic lustre. It is most likely a metallic solid.

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Answer to Conclusion Question

2. A non-polar covalent solid is a very soft, non-conducting solid that is insoluble in water and has a low melting point.

A polar covalent solid is a soft, non-conducting solid that is insoluble in water and has a low melting point.

An ionic solid is a hard, high melting point substance that is soluble in water. Although it will not conduct electricity as a solid, it does so in solution.

A metallic solid is a hard, high-melting point substance that is insoluble in water and conducts electricity in the solid state.

A network solid is a very hard, high-melting point substance that is insoluble in water and will not conduct electricity.