Analysis

(d) According to the evidence collected, solid 1 is network covalent, 2 is ionic, 3 is metallic, and 4 is molecular.

Evaluation

(e) Most of the evidence was sufficient to classify the majority of the solids. The classification of the network covalent solid fits with the properties of network covalent solids but was done mainly by elimination once the others were classified. This classification is very uncertain and it is possible that solid 1 may be a low-solubility ionic solid. The classification of solids 2, 3, and 4 seems relatively certain.

Other properties such as hardness and melting points would help to make the classification more certain.

CHAPTER 4 SUMMARY

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Force or bond	Central particle	Surrounding particles
covalent	electron pair	nuclei
covalent network	electron pair	nuclei
dipole–dipole	charge site	opposite charge sites
hydrogen	proton	electron pairs
ionic	ion	oppositely charged ions
London	nuclei	nearby valence electrons
metallic	nuclei	mobile valence electrons (electron sea)

Substance	Hardness	Melting point	Electrical conductivity		
			Solid	Liquid	Solution
molecular	low	low	negligible	negligible	negligible
ionic	medium to high	high	negligible	high	high
covalent network	high	very high	negligible	negligible	n/a
metallic	medium	medium to high	high	high	n/a

CHAPTER 4 SELF-QUIZ

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1. False: The shape of molecules of the rocket fuel hydrazine, $N_2H_{4(l)}$, is predicted by VSEPR theory to be pyramidal around each nitrogen.
2. True
3. False: A central atom with two bonded atoms and two unshared electron pairs has a V-shaped arrangement of its electron pairs.
4. False: Ionic substances are ionic solids, with ionic bonding.
5. False: Hydrogen bonding is possible whenever the molecule contains hydrogen atoms bonded to N, O, or F atoms.
6. False: A molecule with a pyramidal shape and polar bonds will be polar.
7. True
8. True
9. False: The end of a soap molecule that attracts and dissolves oily dirt must be nonpolar.
10. True
11. (b)
12. (b)