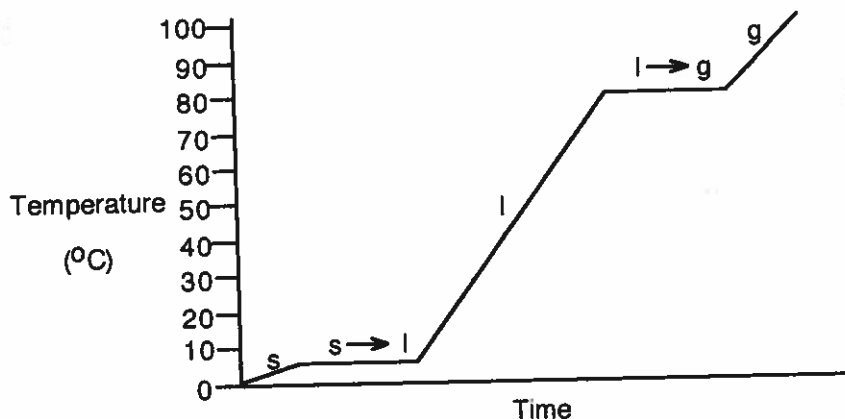
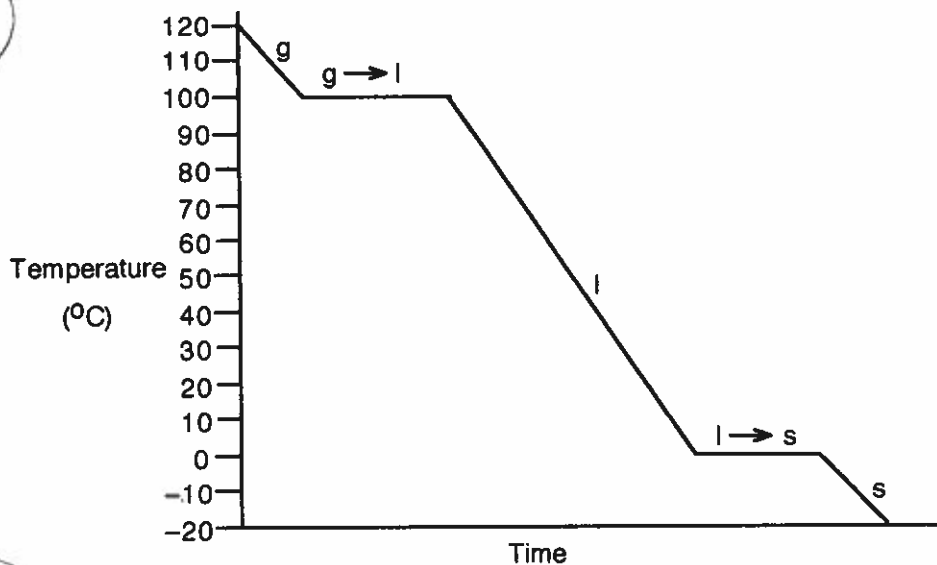


54. There may be more than one way to do this, but one way is:
- use filtration to separate the liquids from the solids
  - use a gravity separation method to separate the two types of sand (put in a mechanical shaker and shake the dry sand; the heavier black sand will accumulate at the bottom of the container)
  - distil the methanol-hexanol mixture to separate the liquids.
- 55.
- Solvent extract the mixture with alcohol. Only the naphthalene will dissolve. The alcohol can later be distilled off or evaporated to leave solid naphthalene.
  - Solvent extract the remaining solids with water. Only the potassium sulphate will dissolve. The water can then be distilled off or evaporated to leave solid potassium sulphate.
  - The calcium carbonate is the only solid left in the original mixture.
56. The mixture will appear as separate layers of aluminum powder, a solution of benzene and chloroform and a final layer consisting of a solution of sugar and water.
- Filter off the aluminum, leaving two layers: benzene-chloroform solution and sugar-water solution.
  - Use hand separation or a separatory funnel to remove the benzene-chloroform layer from the sugar-water layer.
  - Distil the benzene-chloroform solution; the chloroform will come off first, leaving the benzene behind.
  - Distil the water, leaving the sugar behind (if the water was not wanted, the sugar-water solution could just be left in the open or on a hot plate to let the water evaporate).
57. Dissolve the powdered crystals in an appropriate solvent and use chromatography to separate the coloured chemicals from each other. This is appropriate because there is only a little of each chemical.
- 58.
- First, use a magnet to remove the nails.
  - Next, put the remaining mixture through a sieve which allows the white sand and platinum to pass through while holding back the pennies.
  - Finally, use a mechanical shaker to allow the high density platinum to settle to the bottom while the white sand stays on top.
59. (a) physical change (water vapour condenses into droplets of moisture)  
 (b) chemical change (new substances are formed: smoke and various cancer-causing chemicals)  
 (c) chemical change (growth involves chemicals being produced and used up)  
 (d) chemical change (rust is a new substance formed by the combination of iron, air and water)  
 (e) physical change (no reaction has occurred to make new substances)  
 (f) physical change (we are only separating substances, not producing new ones)

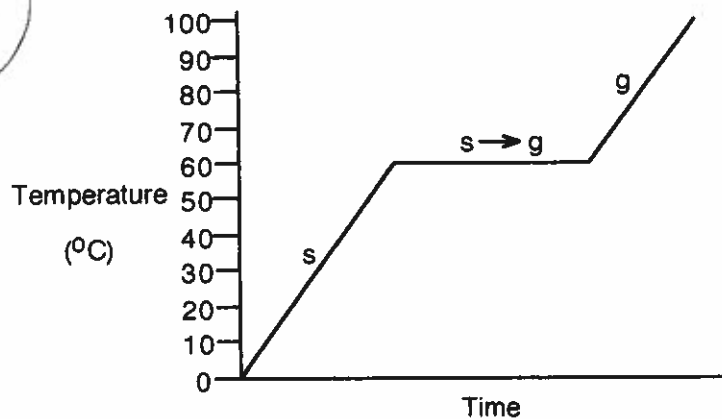
60.



61.



62.



63. (a) At 5 minutes, the sample was about 75% ice and 25% water.  
 (b) At 10 minutes, the sample was about 50% ice and 50% water.

64. The kinetic energy of the particles increases.

65. translational

66. translational

67. translational and rotational

68. rotational and translational

69. The viscosity should decrease as the temperature increases. As temperature increases, the translational energy increases. This allows the molecules to move past one another faster and therefore they must have less resistance to "flow" past one another and possess a lower viscosity.

70. Many bonds in the molecules are identical to each other, so those parts of their spectra are identical.

71. The volume increases (recall that as the translational energy increases we change phase from solid to liquid to gas, and that the volume increases as we go from solid to liquid to gas).