

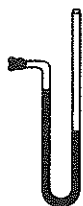
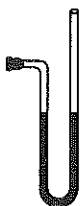


24. Which of the following figures best depicts the change in height of the Hg in the manometer in Experiment 1?

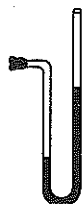
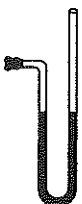
Hg height before liquid was added

Hg height after Hg level stabilized

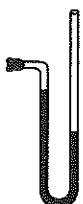
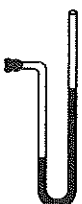
F.



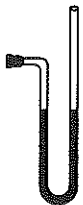
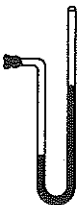
G.



H.



J.



25. A student hypothesized that, at a given external pressure, the higher a liquid's molecular weight, the higher the boiling point of that liquid. Do the results of Experiment 2 and all of the information in the table below support his hypothesis?

Liquid	Molecular weight (grams per mole)
2-Butanone	72
Ethyl acetate	88
Hexane	86
Methanol	32
2-Propanol	60

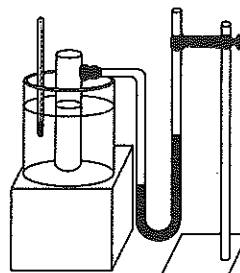
- A. Yes; methanol has the lowest molecular weight and the lowest boiling point.
 B. Yes; ethyl acetate has a higher molecular weight and boiling point than hexane.
 C. No; the higher a liquid's molecular weight, the lower the liquid's boiling point.
 D. No; there is no clear relationship in these data between boiling point and molecular weight.

26. According to the results of Experiment 2, as the external pressure increases, the boiling points of the liquids:

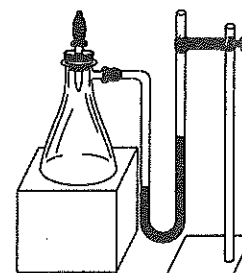
- F. decrease only.
 G. increase only.
 H. decrease, then increase.
 J. increase, then decrease.

27. Which of the following figures best illustrates the apparatus used inside the pressure chamber in Experiment 2?

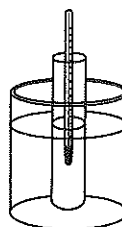
A.



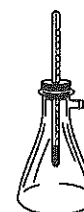
C.



B.



D.



28. Which of the following statements best explains why in Experiment 1 the experimenter waited 5 minutes before connecting the manometer to the flask with the tubing? The experimenter waited to allow:

- F. all of the H₂O vapor to be removed from the flask.
 G. time for the liquid in the flask to evaporate.
 H. time for the height of the Hg in the manometer to stabilize.
 J. the air in the flask to adjust to the temperature of the H₂O bath.

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Passage V

Some of the liquid in a closed container evaporates, forming a vapor that condenses, reforming the liquid. The pressure of the vapor at *equilibrium* (when the rates of evaporation and condensation are equal) is the liquid's *vapor pressure*. A liquid in an open container boils when its vapor pressure equals the *external pressure*. The following experiments were performed to study vapor pressures.

Experiment 1

The apparatus shown in Figure 1 was assembled except for the tubing. The flask was placed in a 20°C H₂O bath. After 5 minutes the manometer was connected, and 2 mL of hexane was added to the flask from the dropper. Some of the hexane evaporated. The vapor pressure was determined by measuring the height of the mercury (Hg) after the Hg level had stabilized. Additional trials were performed at different temperatures and with other liquids in the flask. The results are shown in Table 1.

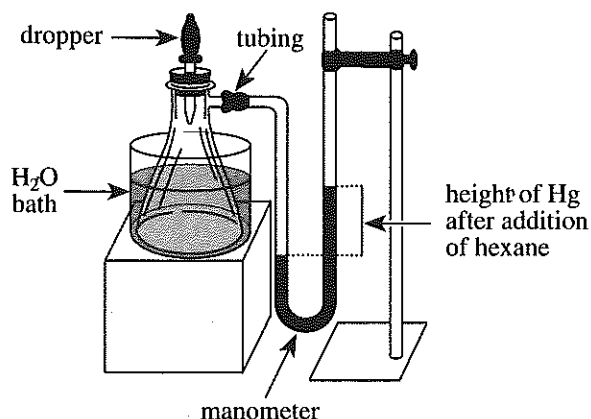


Figure 1

Figure 1 adapted from Henry Dorin, Peter E. Demmin, and Dorothy L. Gabel, *Chemistry: The Study of Matter*. ©1989 by Prentice-Hall, Inc.

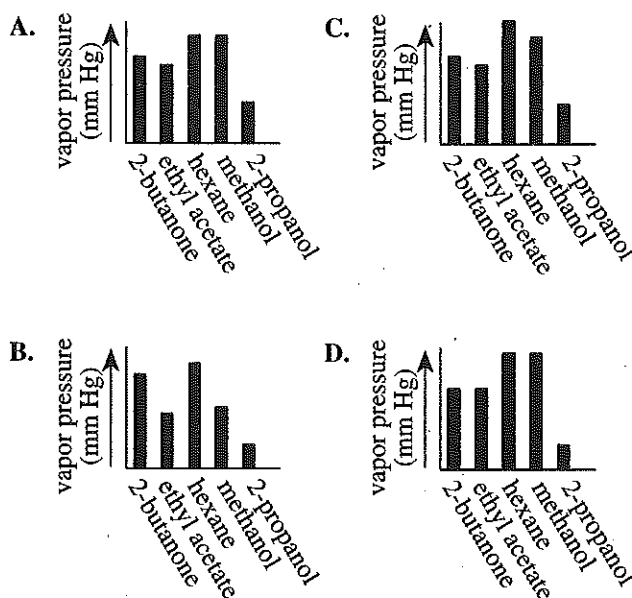
Liquid	Vapor pressure (mm Hg) at:		
	0°C	20°C	40°C
2-Butanone	35	75	200
Ethyl acetate	20	70	180
Hexane	40	110	250
Methanol	25	90	245
2-Propanol	9	35	100

Experiment 2

A test tube containing a thermometer and hexane was heated in an oil bath until the hexane boiled gently. The temperature was recorded. The external pressure was 760 mm Hg. This procedure was repeated in a chamber at pressures of 400 mm Hg and 100 mm Hg. The boiling points of other liquids were also determined. The results are shown in Table 2.

Liquid	Boiling point (°C) at external pressure of:		
	760 mm Hg	400 mm Hg	100 mm Hg
2-Butanone	79.6	60.0	25.0
Ethyl acetate	77.1	59.3	27.0
Hexane	68.7	49.6	15.8
Methanol	64.7	49.9	21.2
2-Propanol	82.5	67.8	39.5

23. Which of the following bar graphs best represents the vapor pressures of the liquids from Experiment 1 at 20°C?



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