S4

Science: Point hack

Mostly seen in the data:

Technique:

Use 2 hands:

1 finger on 1 hand pointing to question

Other hand you may have to use 2-3 fingers to point to x and y axis in the graph or chart

12. In figure 2 at 45 cm in length of the glass pipette

    what is the pressure of the red Xenon gas.

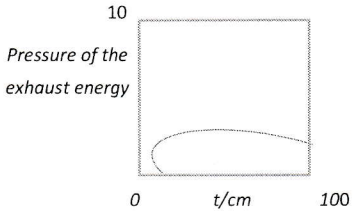


Figure 1

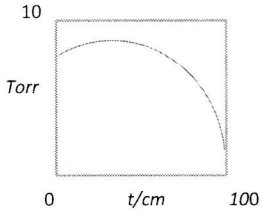


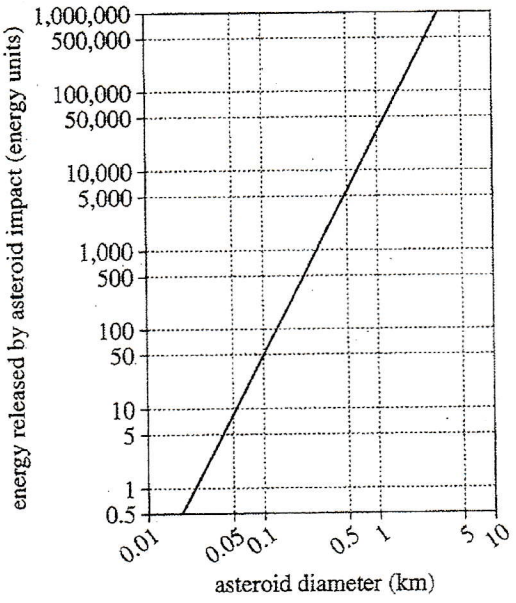
Figure 2

4

Passage III

When an asteroid hits the surface of a planet or moon, an *impact crater* is formed. An asteroid that hits Earth under a specific set of conditions (including speed and angle), referred to here as Set C, forms a crater with a diameter about 20 times the asteroid's diameter. Figure 1 shows the energy released by the impact, for a range of asteroid diameters.

Figure 2 shows the average amount of time that elapses between consecutive impacts on Earth by asteroids with the same diameter, for a range of asteroid diameters. Figure 3 shows the percent of the surface of the Moon, Mercury, and Mars that is covered by impact craters, for various ranges of crater diameter.



Note: One energy unit = the energy released by the detonation of 1 million tons of TNT.

Figure 1

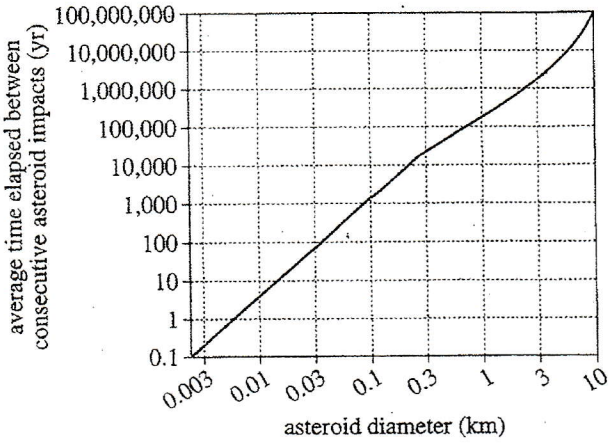


Figure 2

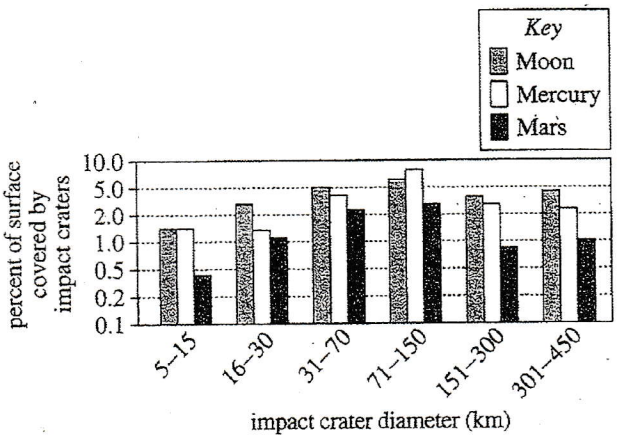


Figure 3

Figures adapted from Eugene M. Shoemaker and Carolyn S. Shoemaker, "The Role of Collisions." ©1999 by Sky Publishing Corp.

13. Suppose that 55 units of energy were released when a particular asteroid, under Set C conditions, hit Earth. According to Figure 1, the asteroid's diameter was most likely closest to which of the following?

    A. 0.05 km
    B. 0.1 km
    C. 0.5 km
    D. 1 km

14. According to Figure 2, for progressively larger asteroids, the average amount of time that elapses between consecutive impacts on Earth by asteroids with the same diameter:

    F. increases only.
    G. decreases only.
    H. varies, but with no general trend.
    J. remains the same.

15. According to Figure 3, for any given range of crater diameters, the percent of the surface of Mars that is covered by impact craters with those diameters is:

    A. less than that for Mercury or the Moon.
    B. less than that for Mercury but greater than that for the Moon.
    C. greater than that for Mercury or the Moon.
    D. greater than that for Mercury but less than that for the Moon.

16. Suppose an asteroid, under Set C conditions, hit Earth to form a crater 20 km in diameter. Based on Figure 1 and other information provided, that asteroid impact most likely released an amount of energy closest to which of the following?

    F. 1,000 energy units
    G. 3,000 energy units
    H. 10,000 energy units
    J. 30,000 energy units

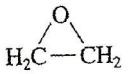
17. Assume that an asteroid that hit Earth 65 million years ago was 10 km in diameter. Also assume that another 10 km asteroid will hit Earth in the future. If the amount of time that elapses between these consecutive impacts is equal to the average amount of time as given by Figure 2, a 10 km diameter asteroid will next hit Earth approximately:

    A. 35 million years from now.
    B. 65 million years from now.
    C. 100 million years from now.
    D. 135 million years from now.

4

Passage

Ethylene oxide, a widely used industrial chemical, has the structure shown below:



Figures 1–3 each show how a property of solutions of ethylene oxide in H_2O varies as the concentration of ethylene oxide increases at 1 atmosphere (atm) of pressure. Concentration is given as the percent ethylene oxide by mass in H_2O (% EO). Figure 1 shows how density at 10°C varies with % EO. Figure 2 shows how freezing point varies with % EO. The *bubble point* is the lowest temperature at which bubbles of gas (in this case, ethylene oxide) form in a solution. Figure 3 shows how bubble point varies with % EO.

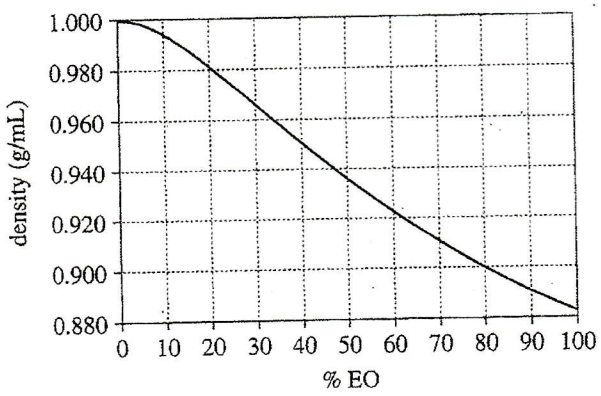


Figure 1

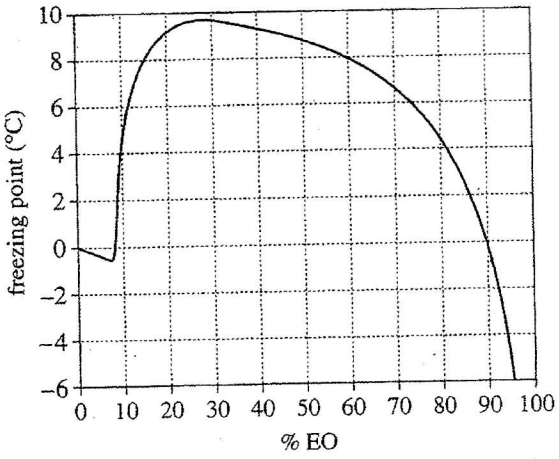


Figure 2

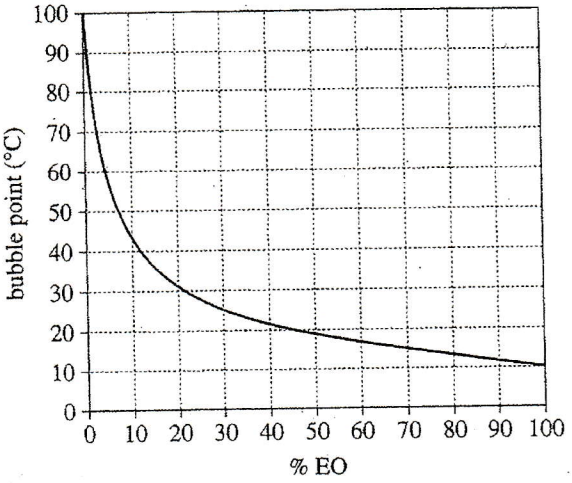


Figure 3

Figures adapted from Old World Industries, The Dow Chemical Company, Shell Chemical Company, Sunoco, Inc., and Equistar Chemicals, LP, *Ethyleneoxide* (2nd ed.). 1999.

25. According to Figure 3, the lowest temperature at which bubbles will form in a 30% EO solution at 1 atm is closest to which of the following?

A. 11°C
B. 25°C
C. 50°C
D. 97°C

26. At 10°C and 1 atm, as % EO increases from 0% to 100%, the mass per unit volume:

F. increases only.
G. decreases only.
H. increases, then decreases.
J. decreases, then increases.

27. At 1 atm, which of the following solutions will have the *lowest* melting point?

A. 20% EO
B. 40% EO
C. 60% EO
D. 80% EO

4

28. According to Figures 2 and 3, at 1 atm, a solution of ethylene oxide in H_2O that has a bubble point of 15°C will have a freezing point closest to which of the following?

F. 0°C
G. 3°C
H. 7°C
J. 10°C

29. Based on Figure 2, at 1 atm, which of the following solutions has a freezing point closest to the freezing point of pure H_2O ?

A. 11% EO
B. 39% EO
C. 61% EO
D. 89% EO