

Answer on Question #54856 - Chemistry - General Chemistry

Question:

If, as a pioneer, you wished to warm your room by taking an object heated on top of a stove into it, which of the following 15 lb objects, each heated to 100 degrees celcius, would be the best choice and why. The specific heat capacity (in J/(g.K)) is given in parenthesis. Iron (0.450), copper (0.387), granite (0.79), gold (0.129), or water (4.18).

Solution:

$$\text{For iron: } Q = c * m * T = 0.450 \frac{J}{g \cdot K} * (15 * 454)g * (100 + 273)K = 1143.06 \text{ kJ}$$

$$\text{For copper: } Q = c * m * T = 0.387 \frac{J}{g \cdot K} * (15 * 454)g * (100 + 273)K = 983.03 \text{ kJ}$$

$$\text{For granite: } Q = c * m * T = 0.790 \frac{J}{g \cdot K} * (15 * 454)g * (100 + 273)K = 2006.70 \text{ kJ}$$

$$\text{For gold: } Q = c * m * T = 0.129 \frac{J}{g \cdot K} * (15 * 454)g * (100 + 273)K = 327.68 \text{ kJ}$$

For water, there will be a boiling and phase transformation at 100 degrees Celsius to form a vapor. Therefore, the best solution of the problem is the use of granite as a heater (2006.70 kJ for a given weight of substance).

Answer:

According to the conditions of the problem, granite is the best heater.