

Answer on Question #44816 – Chemistry - Physical Chemistry

a. Define the following terms and indicate units in which they are normally expressed,

1. Density
2. Specific heat
3. Thermal conductivity

In each case state how a low numerical value for the property would affect the ease with which a solid can be ignited

Answer:

1.

Density - a scalar physical quantity, defined as the ratio of body weight to the volume occupied by this body. [kg/m^3]

2. *Specific heat* - the ratio of the weight of the heat capacity, the heat capacity of unit mass of the substance (different for different substances); the physical quantity is numerically equal to the amount of heat which must convey unit weight of the substance to the temperature change per unit. [$\text{J}/\text{kg}\cdot\text{K}$]

3. *Heat conduction (or thermal conduction)* is the transfer of internal energy by microscopic diffusion and collisions of particles or quasi-particles within a body due to a temperature gradient. The microscopically diffusing and colliding objects include molecules, electrons, atoms, and phonons. They transfer disorganized microscopic kinetic and potential energy, which are jointly known as internal energy. Conduction can only take place within an object or material, or between two objects that are in direct or indirect contact with each other. Conduction takes place in all forms of ponderable matter, such as solids, liquids, gases and plasmas. [$\text{W}/\text{m}\cdot\text{K}$]

The ease of ignition substance does not depend on the density, thermal conductivity and specific heat of the substance. Ease of ignition solid depends primarily on its chemical composition and dispersion.

b. What are units of energy and power

Answer:

Energy is measured in [J], $1 \text{ J} = 1 \text{ N} \cdot \text{m}$. Unit of measurement possibilities in the International System of Units is the Watt [W]. $1 \text{ W} = \text{J}/\text{s}$

c. Electric lighting is often overlooked as a potential source of ignition. List factors that might lead to a light fitting becoming an ignition source.

Answer:

Electric filament (LF) as a general-purpose light source are extremely widely used. Their fire hazard consists of two components: the danger of ignition of combustible materials in non-compliance with flameproof distance from their flasks, and the danger of under emergency conditions in LN ignition sources with high fire-power.

In the first case, the fire danger is caused by the high temperatures heating bulbs. The heating temperature depends on the capacity flasks LF, the position in space of the flask and the flask surface cleanliness. Thus, if the surface is clean flasks, depending on the capacity of IL its temperature reaches the heating $80\text{-}170^\circ \text{C}$. If the bulb lights are contaminated, such as

various industrial dust (wood, flour, herbal, etc.), the heating temperature can be significantly increased and reach 250-300 ° C.

In practice, the fires of LF often result from the use of high-power LF, because instead of the recommended manufacturer of lamp power for the light used LN more power, because the sockets of incandescent lamps in the range of 15 to 300 W are the same. Therefore, there are cases deck plastic lampshades. The highest heating temperature in the flask was developed in the field of contact it with a material of low thermal conductivity.

Under certain conditions arise LF arcing between the electrodes. In one case, arc discharge may cause rupture of the bulb, the other - of its penetration by particles of nickel formed as a result of melting of the arc electrode. In both cases, the emergency mode is accompanied by the formation and release of ignition sources (nickel particles, hot tungsten spiral and structural elements, heated to high temperatures). Most nickel particles are flammable because they are highly flammable capacity. Under experimental conditions, the occurrence of arcs in the LF is achieved by high voltage. In practice, such cases are possible when voltage unbalance.

Preventing accidental conditions to form droplets by melting electrodes LN general purpose is achieved by setting them built-in fuses. In the conditions of fixtures with incandescent bulbs can reduce contact with electrical cartridge and associated sparking local heating and ignition wire insulation, plastic cartridge and other closely spaced combustible materials.

Currently, the interior lighting is widely used lamps with fluorescent lamps. Flammable elements in them are starter capacitors with paper dielectric diffusers made of organic glass, etc..

d. Discuss why the use of electrical adaptors and extension leads in workplace should be minimised."

Answer:

Using electrical adapters and extension leads in the workplace should be minimized because it reduces the amount of contact comes into contact. Most often contacts overheat due to the different electrical conductivity of metals. This may cause a fire or electric shock.