

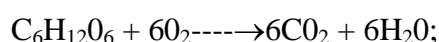
Respiration-R.Q. and values

The energy present in one gram of different respiratory substrates is

- (i) Fat-9.8 kcal or 41 kJ
- (ii) Protein-4.8 kcal or 20 kJ
- (iii) Carbohydrate -4.4 kcal or 18.4 kJ. The realized value is slightly less.

R.Q. or respiratory quotient is the ratio of volume of carbon dioxide evolved to the volume of oxygen consumed per unit time per unit weight. $RQ. = CO_2/O_2$. It is useful in knowing the type of respiration, major transformations and respiratory substrate. For example, R.Q value is

- (i) Unity - Aerobic respiration, respiratory substrate carbohydrate. .



$$R.Q \ 6CO_2 / 6O_2 = 1$$

- (ii) Infinity- Anaerobic respiration.

Zymase

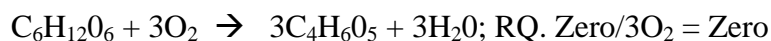


$$RQ. \ 2CO_2 / \text{Zero} = \text{Infinity}$$

- (iii) Zero-

(a) Succulents due to carbon fixation during night and closure of stomata during day.

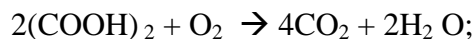
(b) Oxidation of carbohydrates to form organic acids.



- (iv) More than One –

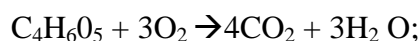
(a) Maturing fatty seeds

(b) Organic acids (4 for oxalic acid, 1.3 for malic acid, 1.14 for succinic acid).



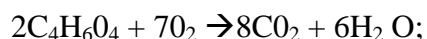
oxalic acid

$$RQ = 4CO_2 / O_2 = 4.0$$



malic acid

$$RQ. \ 4CO_2 / 3O_2 = 1.3$$



succinic acid

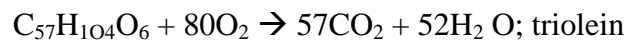
$$RO = 8CO_2 / 7 O_2 \text{ or } 1.14$$

(v) Less than One-

(a) Fats (=0.7)

(b) Protein (=0.7-0.9)

(c) Germination of fatty seeds.



$$\text{RQ} = 57\text{CO}_2 / 80\text{O}_2 = 0.71$$



$$\text{RQ} = 102\text{CO}_2 / 145\text{O}_2 \text{ or } 0.7$$