$$= \mu RT \{ \log_e V_f - \log_e V_i \}$$

$$W_{iso} = \mu RT \log_e (V_f/V_i) \quad -(3)$$

$\log_e X = 2.303 \log_{10} X$

$= 2.303 \log X$

$$W_{iso} = 2.303\, \mu RT \log_{10} \frac{V_f}{V_i} \quad -(4)$$

EXAMPLE: Three moles of an ideal gas, kept at a constant temperature 27^{0}C, is compressed from 4 litre to 1 litre. Calculate the work done in this process.

(Given: R = 8.31 J/mol-K; log0.25 = -0.6021)

$\mu = 3$ mole

$T = 27°C$

$T = (273+27)K = 300K$

$V_i = 4$ Lt , $V_f = 1$ Lt

$R = 2$ cal/mol-k.

$$W_{iso} = 2.303\, \mu RT \log_{10} \frac{V_f}{V_i}$$

$$= 2.303 \times 3 \times 8.31 \times \log_{10}\left(\frac{1}{4}\right) \text{ J}$$

$$= 2.303 \times 3 \times 8.31 \times \log_{10} 0.25$$

$$= 2.303 \times 3 \times 8.31 \times (-0.6021) \text{ J}$$

$$W_{iso} = -34.5688 \text{ J}$$