QUES 02:-

During an adiabatic compression, 830 J of work is done on 2 moles of a diatomic ideal gas to reduce its volume by 50%. The change in its temperature is nearly:
($R = 8.3\ JK^{-1}\ mol^{-1}$) [Main Online April 11, 2014]
(a) 40 K (b) 33 K (c) 20 K (d) 14 K

(c) Given : work done, $W = 830$ J
No. of moles of gas, $\mu = 2$
For diatomic gas $\gamma = 1.4$
Work done during an adiabatic change

$$W = \frac{\mu R(T_1 - T_2)}{\gamma - 1}$$

$$\Rightarrow 830 = \frac{2 \times 8.3(\Delta T)}{1.4 - 1} = \frac{2 \times 8.3(\Delta T)}{0.4}$$

$$\Rightarrow \Delta T = \frac{830 \times 0.4}{2 \times 8.3} = 20\ K$$