PART F *(Block 5 and Topic Study 2, Part 1)*

Q6.22 Examine the statements in the key, and then select *two* that are **incorrect**.

KEY for Q6.22

A A chemical promoter is a substance that, when added to a catalyst in small amounts, enhances the activity of the catalyst.

B Nitrogen gas, $N_2(g)$, is capable of being physically adsorbed to multilayer coverage on a metal surface at room temperature.

C The magnitude of the adsorption coefficient, b, for chemical adsorption usually decreases with increasing temperature.

D In a thermal desorption experiment, physisorbed species will desorb at lower temperatures than chemisorbed species.

E Shape-selective catalysis by zeolites derives from the fact that these crystalline aluminosilicates contain acid sites located within an internal pore structure of molecular dimensions.

F If the enthalpy change for dissociative chemical adsorption of hydrogen, $H_2(g)$, on a transition metal surface is $-90\ kJ\ mol^{-1}$, and the chemisorption is activated, then the activation energy for desorption is equal to $90\ kJ\ mol^{-1}$.

G The Langmuir model of adsorption assumes that there is the same probability of adsorption at all sites, independent of whether adjacent sites are occupied or not.

Q6.23 to Q6.28 These questions are concerned with the Lennard-Jones plot for the dissociative chemisorption of a molecule $X_2(g)$ on the surface of a metal, M, shown in Figure 6.3.

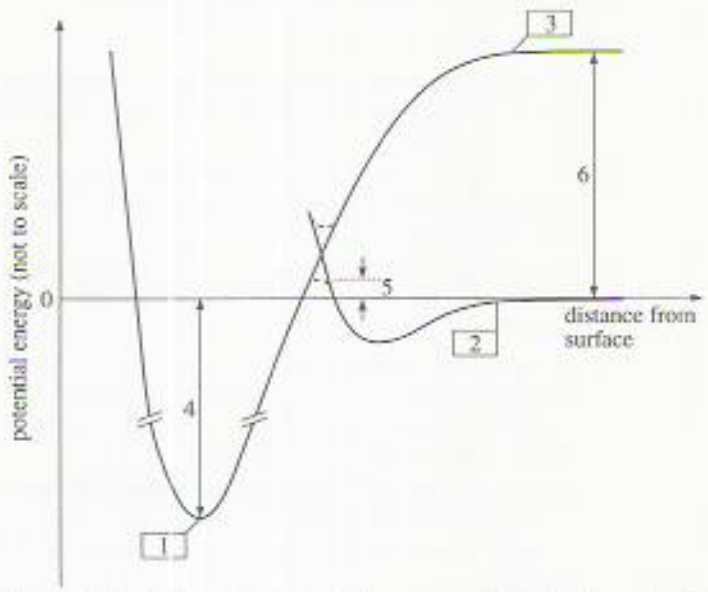


Figure 6.3 Schematic potential energy plot for the dissociative chemisorption of a molecule $X_2(g)$ on the surface of a metal, M. The plot is not to scale, and is drawn in an exaggerated fashion to highlight the main features.

Q6.23 to Q6.25 These questions refer to the labels that should be inserted in the boxes marked 1 to 3 in Figure 6.3. In each case, you are asked to select the *one* **correct** label from the following key. (The symbol $*_M$ represents a site for *chemisorption* on the surface.)

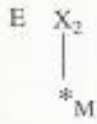
KEY for Q6.23 to Q6.25

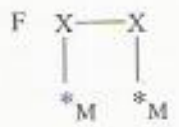
A $X_2(g) + M$

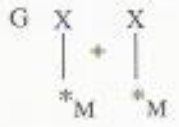
B $X_2(g) + *_M$

C $X_2(g) + 2*_M$

D $2X(g) + 2*_M$

E 

F 

G 

Q6.23 Select from the key for Q6.23 to Q6.25 the label that represents the condition of the system at the potential energy minimum indicated by the box marked 1 in Figure 6.3.

Q6.24 Select from the key for Q6.23 to Q6.25 the label that represents the condition of the system at the point indicated by the box marked 2 in Figure 6.3.

Q6.25 Select from the key for Q6.23 to Q6.25 the label that represents the condition of the system at the point indicated by the box marked 3 in Figure 6.3.