14.

The curve above is obtained for the reaction of an excess of $CaCO_3$ with hydrochloric acid. How and why does the rate of reaction change with time?

Rate of reaction   **Reason**
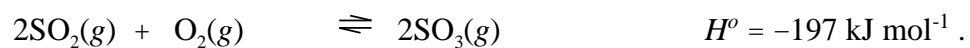
A. decreases   the HCl becomes more dilute
B. decreases   the pieces of CaCO

17.   The manufacture of sulfur trioxide can be represented by the equation below.

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g) \qquad\qquad H^o = -197 \text{ kJ mol}^{-1}.$$

What happens when a catalyst is added to an equilibrium mixture from this reaction?

A. The yield of sulfur trioxide increases.
B. The rate of the forward reaction increases and that of the reverse reaction decreases.
C. The rates of both forward and reverse reactions increase.
D. The value of H^o increases.
E. The value of H^o decreases.

18.   Hydrogen and carbon dioxide react as shown in the equation below.
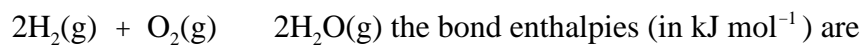$$H_2(g) + CO_2(g) \rightleftharpoons H_2O(g) + CO(g)$$
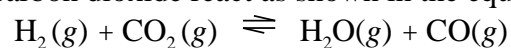
For this reaction the values of K_c with different temperatures are

21. Use the bond enthalpies provided to determine which of the answers below gives the enthalpy of the reaction in kJ mol^{-1}

$$H_2N-N=N-NH_2(g \qquad _2N-NH_2(g \qquad g)$$

A. -475   B. -317   C. +317   D. +475   E. 633

22. For the reaction

$$2H_2(g) + O_2(g) \qquad 2H_2O(g) \text{ the bond enthalpies (in kJ mol}^{-1}) \text{ are}$$
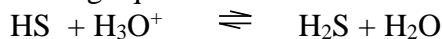
H-H	X

25. When the pH of a solution changes from 2.0 to 4.0, the hydronium ion (H_3O^+) concentration

   A. increases by a factor of 100   B. increases by a factor of 2
   C. decreases by a factor of 2   D. decreases by a factor of 100
   E. decreases by one half

26. What is the pH of a solution made by mixing 10.0 mL of 0.015 mol L^{-1} HCl and 25.0 mL of 0.025 mol L^{-1} HCl?

   A. 1.12   B. 1.65   C. 1.75   D. 1.82   E. 2.00

27. The pH of the blood of a healthy person is in the range 7.35-7.45. What is the concentration (in mol L^{-1}) of OH^- in healthy blood at pH 7.35 and 37 °C?
        K_w 10^{-14} $pK_w = 13.63$

   A. 3.55 x 10^{-8} B. 4.47 x 10^{-8} C. 1.17 x 10^{-7}
                  D. 2.24 x 10^{-7} E. 5.25 x 10^{-7}

28. A 150 mL solution of 0.2 mol L^{-1} HCl was mixed with an unknown mass of NaOH, the final pH is 1.52. what is the mass of NaOH added?
                M(NaOH= 40 g mol^{-1})

   A. 0.2 g   B. 0.5 g   C. 1.0 g.   D. 1.2 g.   E. 1.5 g

29. Potassium hydrogen sulfide, KHS, is a slightly basic solution and will react with acid in the following equation:
        HS^- + H_3O^+ ⇌ H_2S + H_2O
   After HCl is added then a base (KOH) can be added to reform the HS^-, but when this is done the amount of KHS recovered is always lower than originally added. This is because:

   A. HS^- is also an acid
   B. HS^- is a weak base
   C. H_2S is not very water soluble and some leaves the flask as a gas when acid is added.
   Ṉ8H$m 8heaḰbḰʄCr14s6h4(ṡṁletḃlɗ0sɗ4ṡ7thḋḦCḻ)] TJETQ0.0 G[(Thed(oll)k gr10(a)4(y G[(W)id0.00m 84
   E. HSCl forms a solid at the bottom of the flask.

30. In order to identify a white solid the following test were carried out.
   Step 1   When water was added to the sample the white solid dissolved to form a colourless solution.
   Step 2 -

31. Thiocyanate ions (SCN⁻) react with iron(III) ions in solution to form a complex ion which is a blood-red colour.

$$Fe^{3+}(aq) + SCN^-(aq) \rightleftharpoons [Fe(SCN)]^{2+}(aq)$$
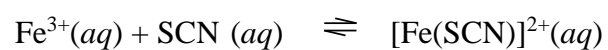
In an experiment to find the equilibrium constant, K_c, for this reaction 45.00 mL of a solution containing 0.200 mol L⁻¹

37.   A mining company carried out an analysis of an ore sample to find out how much copper