Example 1.1. The above transition rule is illustrated in Fig. 1.1 using the well-known chemical reaction: $2H_2 + O_2 \rightarrow 2H_2O$. Two tokens in each input place in Fig. 1.1(a) show that two units of H_2 and O_2 are available, and the transition t is enabled. After firing t, the marking will change to the one shown in Fig. 1.1(b), where the transition t is no longer enabled.

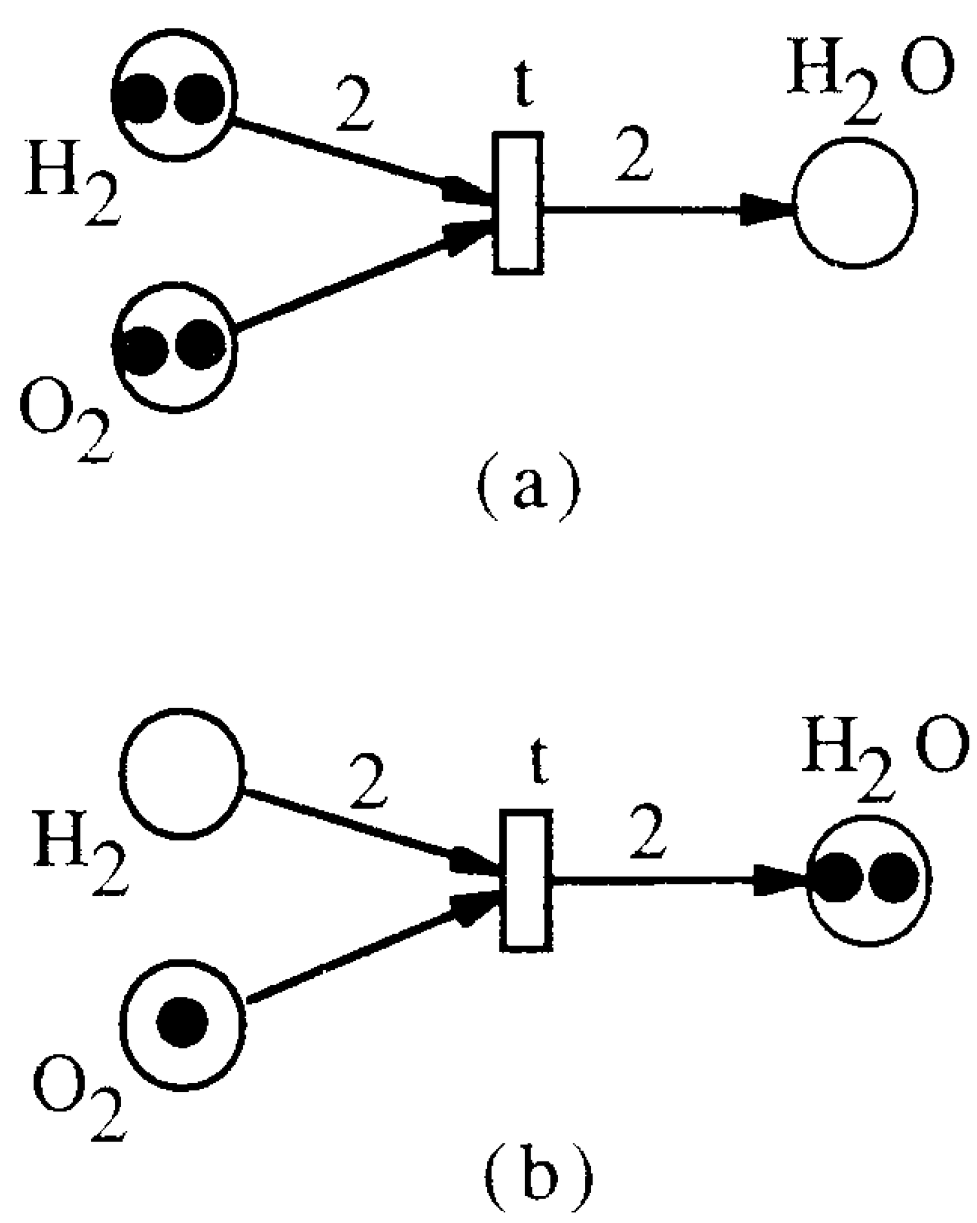

Fig. 1.1. Example 1.1: An illustration of a transition (firing) rule: (a) The marking before firing the enabled transition *t*. (b) The marking after firing *t*, where *t* is disabled.

For the above rule of transition enabling, it is assumed that each place can accommodate an unlimited number of tokens. Such a Petri net is referred to as an *infinite capacity net*. For modeling many physical systems, it is natural to consider an upper limit on the number of tokens that each place can hold. Such a Petri net is referred to as a *finite capacity net*. For a finite capacity net (N, M_0), each place p has an associated capacity K(p), the maximum number of tokens that p can hold at any time. For finite capacity nets, a transition t to be enabled when not only (1-1) holds but also the number of tokens in each output place p of t can not exceed its capacity K(p) at any time, i.e.,

$$M(p) + w(t, p) \leq K(p) \text{ for all p.} \qquad (1\text{-}3)$$