Pearson

16.1: Batman's Basic Blunder

In an episode of the Batman comic book series (*War Crimes 4: Judgement at Gotham*), the Joker attacks another villain named Black Mask (who is masquerading as Batman) with an acid-filled dart. The acid begins to chemically burn into Black Mask's head, but the real Batman arrives on the scene and showers Black Mask with a base, saving him. Batman tells Black Mask that he will be fine because the base neutralizes the acid.

Did Batman take the right action in counteracting the acid dart? Presumably the acid used by the Joker was fairly concentrated; otherwise it would not have begun to burn into Black Mask's head. It is true that a concentrated base would neutralize the acid in the dart. However, the concentrated base would likely cause further problems for two reasons. First, the neutralization reaction between a concentrated acid and a concentrated base is highly exothermic, so Batman's treatment is likely to have produced a significant amount of heat, leading to thermal burns (from the heat) for Black Mask. Second, concentrated bases are themselves caustic to the skin, so Batman's base has the potential to cause further additional chemical burns as well. The standard treatment for spilling concentrated acid on the skin is to rinse with large amounts of water for an extended period of time. The water dilutes the acid and washes it away. Black Mask would have been better off with a shower.

In this chapter, we examine acid and base behavior. Acids and bases are found in many household products, foods, medicines, and in nearly every chemistry laboratory. Acid–base chemistry is central to much of biochemistry and molecular biology. The building blocks of proteins, for example, are acids (called amino acids), and the molecules that carry the genetic code in DNA are bases.