The first important distinction we will make is among the terms analysis, determination, and measurement. An analysis provides chemical or physical information about a sample. The component of interest in the sample is called the analyte, and the remainder of the sample is the matrix. In an analysis we determine the identity, concentration, or properties of an analyte. To make this determination we measure one or more of the analyte’s chemical or physical properties.

![Colonies of fecal coliform bacteria from a water supply. Source: Susan Boyer. Photo courtesy of ARS–USDA (www.ars.usda.gov).](image)

**Figure \(\PageIndex{1}\):** Colonies of fecal coliform bacteria from a water supply. Source: Susan Boyer. Photo courtesy of ARS–USDA (www.ars.usda.gov). Fecal coliform counts provide a general measure of the presence of pathogenic organisms in a water supply. For drinking water, the current maximum contaminant level (MCL) for total coliforms, including fecal coliforms is less than 1 colony/100 mL. Municipal water departments must regularly test the water supply and must take action if more than 5% of the samples in any month test positive for coliform bacteria.

An example helps clarify the difference between an analysis, a determination and a measurement. In 1974 the federal government enacted the Safe Drinking Water Act to ensure the safety of public drinking water supplies. To comply with this act, municipalities regularly monitor their drinking water supply for potentially harmful substances. One such substance is fecal coliform bacteria. Municipal water departments collect and analyze samples from their water supply. They determine the concentration of fecal coliform bacteria by passing a portion of water through a membrane filter, placing the filter in a dish containing a nutrient broth, and incubating for 22–24 hr at 44.5 °C ± 0.2 °C. At the end of the incubation period they count the number of bacterial colonies in the dish and report the result as the number of colonies per 100 mL (Figure \(\PageIndex{1}\)). Thus, municipal water departments analyze samples of water to determine the concentration of fecal coliform bacteria by measuring the number of bacterial colonies that form during a carefully defined incubation period.

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