**Formulation toxicity**

Measures of acute toxicity vary in nature.  For acute oral toxicity, the Median Lethal Dose (MLD) or LD50 is used.  In principle this is on a continuous scale.  But sometimes the MLD is outside the range of doses tested, or only one dose may be tested, producing results such as >300 mg/kg, or <200 mg/kg.  If the data is not ours but someone else’s, then often only the resulting acute toxicity class is available, eg Category 4, meaning 300-2000 mg/kg.  For other types of acute toxicity, eg skin irritation, usually only class data is available (non irritant vs irritant vs severe irritant).

An ATE (acute toxicity estimate) is an estimate of acute toxicity of a formulation based on the toxicity of its components.  Basically toxicity of a mixture is obtained by adding the toxicity of each component, taking into account the proportion of each component.  But to make it additive you need to take the inverse of the toxicity value, eg MLD.

Significant deviation from additivity is rare, and is either synergism (1+1>2) or antagonism (1+1<2).  Acute oral tox categories and ATE calculation is shown below.