

■ Correction for temperature

Most of Gastec detector tubes are designed to be used at temperatures of 0 to 40°C (32 to 104°F). They are calibrated based on a tube temperature (NOT sample temperature) of 20°C (68°F).

Some tubes, however, are very sensitive and may not provide correct indications

at temperatures other than 20°C. If indications are affected more than ±10%, tube readings should be corrected. For each detector tube, information such as temperature correction or any other necessary correction is provided in the instruction sheet for the tube.

Example 1 : Temperature correction factors for 1,1,1-Trichloroethane detector tube (No.135)

Temperature	0°C (32°F)	10°C (50°F)	20°C (68°F)	30°C (86°F)	40°C (104°F)
Correction factor	1.4	1.3	1.0	0.8	0.65

$$\text{True concentration} = \text{Tube reading} \times \text{Correction factor (ppm)}$$

Example 2 : Temperature correction table for Tetrachloroethylene detector tube (No.133M)

Tube reading (ppm)	True concentration (ppm)				
	0°C (32°F)	10°C (50°F)	20°C (68°F)	30°C (86°F)	40°C (104°F)
100	410	155	100	80	65
80	310	125	80	65	50
60	210	95	60	50	40
40	130	60	40	35	25
20	55	30	20	17	15
10	20	13	10	8	7
5	8	6	5	4	3

● **Influences of temperatures**

With some detector tubes, reaction rates and physical adsorption of reagents are greatly influenced by tube temperatures:

(1) **Influences on reaction rate**

Generally chemical reaction rates are proportional to the temperature.

① When the temperature is lower than 20°C (68°F):

Reaction will slow down and some quantity of the sample will not react in the normal reaction area for 20°C (68°F) but will sparsely react further into the tube. As a result, a longer layer of pale colour change is produced, giving a higher indication.

② When the temperature is higher than 20°C (68°F):

Reaction will become active and the most or all of the sample will react in a shorter distance than the normal reaction area for 20°C (68°F). As a result, a short layer of distinct colour change is produced, giving a lower indication.

Examples of such detector tubes:

Acetylene (No.171),
Carbon Monoxide (No.1La),
Propane (No.100B)

(2) **Influences on physical adsorption**

Generally the quantity of physical adsorption of a certain substance to its reagent is inversely proportional to the temperature. At lower temperatures, some quantity of the substance will be physically adsorbed to the reagent that has already reacted with the preceding substance, and will not reach to the normal reaction area. As a result, a short layer of colour change is produced, giving a lower indication. On the contrary, at higher temperatures, higher indications will be obtained.

Examples of such detector tubes:

Water vapour (No.6L)
Ethyl acetate (No.141)

● **Tube temperature and sample temperature**

When air is sampled, its temperature is instantly assimilated to the temperature of the detector tube. The term "temperatures" used for corrections of tube readings means tube temperatures, NOT sample temperatures. If detector tubes are kept in a certain ambient for a while, the tube will become the ambient temperature. Therefore, the detector tubes just taken out of a cool storage like a refrigerator have the same temperature as the storage. but it will gradually be assimilated to the ambient temperature.