Technical Information

3M™ Clean-Trace™ Surface Protein Tests - Principle of the Test

Clean-Trace Surface Protein tests are based on the patented (Numa et al 1999) Konica enhanced buiret colour change chemistry. Under alkaline conditions copper ions (Cu^{2+}) form a complex with (protein) peptide bonds and are reduced to copper Cu^{+}. Bicinchoninic acid (BCA) under alkaline conditions is a highly sensitive, stable (no need for refrigeration) and specific reagent for Cu^{+} and leads to the formation of the purple complex. The chromogen, once formed, can be assessed visually (as with the Clean-Trace Surface Protein tests) or assayed with a spectrophotometer (absorbance at 562nm).

$$\text{Protein} + Cu^{2+} \xrightarrow{OH^-} \text{Protein-}Cu^{+} \xrightarrow{+\text{ BCA}} \text{Purple complex}$$

The limit of detection of the Clean-Trace Surface Protein tests using our standard 10 minute incubation step was experimentally determined as 50 to 60 ug with a $100cm^2$ swab area (Bovine Serum Albumin, BSA).

Table 1:
Detection of protein (BSA). Detection on the swab and spread on a 10 x10 cm surface area (tested wet and dry) were compared.

1: Green (Pass), 2: Grey (Caution), 3: Purple (Fail), 4: Dark Purple (Fail)

Amount of protein/100 µl	Colour level (1-4)		
	On Swab	Wet Surface	Dry Surface
10000 µg	4	4	4
5000 µg	4	4	4
2500 µg	4	3/4	3/4
1250 µg	4	3/4	3/4
625 µg	4	3/4	3
312 µg	¾	3	3
156 µg	3	3	2/3
100 µg	3	2	2
80 µg	2/3	2	2
60 µg	2	2	1/2
50 µg	2	1/2	1
40 µg	½	1	1
0 µg (water only)	1	1	1