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Rapid Solutions for Food Safety

## PRO-Clean Technical Information

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### Application of test-

PRO-Clean is a quick and easy way to accurately monitor the cleanliness of food equipment surfaces to help ensure food safety and product quality. PRO-Clean detects protein residues left on a surface after cleaning. Simply swab a surface, release the reagent and if food residue is present the reagent will turn purple. The color change provides a semi-quantitative measure of the surface cleanliness. The more contamination present, the quicker the color change to purple and the darker the color. PRO-Clean quickly validates the hygiene of a surface, allowing immediate corrective action to be taken if necessary.

### Principles of the test-

The test is based on the principle of the Biuret reaction where under alkaline conditions the copper ions ( $\text{Cu}^{2+}$ ) form a complex with the peptide bonds of proteins and becomes reduced to copper  $\text{Cu}^+$ . Bicinchoninic acid (BCA) under alkaline conditions is a highly sensitive, stable and specific reagent for  $\text{Cu}^+$  forming a purple complex. The chromogen formed can be assessed visually with the PRO-Clean device.



### Test performance-

The reaction is time-dependent i.e the color develops with time and therefore it is important to record color change up to 10 min and disregard any color change after this set time. Most reactions happen within 60 seconds. Timing can be stopped as soon as any color change is observed. PRO-Clean provides dirty or clean result as well as a how dirty result based on the speed of the reaction.

The reaction is also temperature-dependent and therefore it is important to allow the devices to equilibrate to ambient room temperature (15 - 25°C) if they have been stored at a different temperature.

### Other reducing agents giving a positive result with PRO-Clean-

This test also detects other substances capable of reducing the copper ( $\text{Cu}^{++}$  to  $\text{Cu}^+$ ) such as reducing sugars (glucose) and uric acid. Other strong reducing materials such as ascorbic acid (present in some fruit juices) or tannin (present in tea) may also give a positive result with PRO-Clean.

### Sensitivity performance-

20ug protein in 10 minutes at room temperature

10ug 10 minutes at 37°C



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## PRO-Clean concentration corresponding to color level with PRO-Clean

The chart below shows the color change associated certain dilutions of Protein. ( $\mu\text{g}/100\mu\text{l}$ )



Levels	Detection	Color Change	Result
1	0 - 15ug	Lime green	Pass
2	20 - 60ug	Grey/Light Purple	Fail
3	60 - 300ug	Light Purple	Fail
4	>300ug	Dark Purple	Fail

## Summary of Products Tested with PRO-Clean

Product Category Detected Comments

PRODUCT	CATEGORY	DILUTION	DETECTED	COMMENTS
Ground Beef	Meat		Yes	Level 4 within 10 min
Beef Steak	Meat		Yes	Level 4 within 10 min
Processed Beef	Meat	1/10	Yes	Level 3 after 5 min
Processed Ham	Meat			Level 2 within 10 min
Raw Chicken	Meat	1/10	Yes	Level 4 after 5 min
Cooked Chicken	Meat	1/10	Yes	Level 3 after 5 min
Raw Eggs	Meat			Level 4 within 10 min
Shrimp	Meat	1/10	Yes	Level 3 within 10 min
Fish	Meat	1/10	Yes	Level 4 within 10 min
Pasteurized Milk	Dairy	1/10	Yes	Level 4 within 10 min
UHT Milk	Dairy	1/10	Yes	Level 4 within 10 min
Cream	Dairy	1/10	No	Inhibits Signal
Cheddar Cheese	Dairy	1/10	Yes	Level 4 within 4 min
Cottage Cheese	Dairy	1/10	Yes	Level 4 within 10 min
Yoghurt	Dairy	1/10	Yes	Level 3 within 10 min
Margarine	Dairy	1/10	No	Not enough protein



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Coke	Beverage	1/1	Yes	Level 3 within 10 min
Orange Juice	Fruit	1/10	Yes	Level 4 within 2 min
Cranberry Juice	Fruit	1/10	Yes	Level 4 within 2 min
Pineapple	Fruit	1/10	Yes	Level 4 within 2 min
Banana	Fruit	1/10	Yes	Level 4 within 2 min
Chocolate	Confectionary	1/10	Yes	Level 4 within 2 min

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