

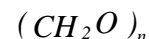


Product Information

PARAFORMALDEHYDE Sigma Prod. No. P6148 and P1213

CAS NUMBER: 30525-89-4

SYNONYMS: Formagene, paraform, triformol, paraformic aldehyde, polyoxymethylene, flo-more



PHYSICAL DESCRIPTION:

Appearance: P6148 - White powder; P1213 - "Prilled" (small white beads)

Structure: Polymer of CH_2O (monomer formula weight = 30.0)

Melting/decomposition: $156-165^\circ C$ ^{1,2} The powder decomposes on heating to form formaldehyde gas. Please consult the Material Safety Data Sheet (MSDS) for information on this product, which is described as a severe irritant, sensitizer and harmful.³

STORAGE / STABILITY AS SUPPLIED:

Paraformaldehyde is somewhat moisture-sensitive and over time tends to sublime, forming formaldehyde gas. For the powdered P6148, storage under argon or nitrogen at $2-8^\circ C$ is recommended.³ Due to its lower surface area/larger particle size, P1213 sublimates more slowly, and is less likely to be airborne during handling. This product may be stored at room temperature.

SOLUBILITY / SOLUTION STABILITY:

Paraformaldehyde is tested at 10 mg/mL in 1 M NaOH, giving a clear colorless solution. It is only slowly soluble in cold water, and most often is heated in water to depolymerize it. Paraformaldehyde is usually dissolved when the solution reaches $55-60^\circ C$.⁴ It is advised to use a hot water bath rather than a hot plate when heating the solution "hot spots" (and thus decomposition) in the solution.⁵ If the solution remains cloudy, the addition of 1-2 drops of NaOH will cause it to clear, giving a formaldehyde solution which will be suitable for use for about two weeks if stored refrigerated. Note: Formaldehyde gas is evolved as paraformaldehyde dissolves.³

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SOLUBILITY / SOLUTION STABILITY: (continued)

Some protocols suggest that paraformaldehyde should be prepared in buffered solutions such as phosphate buffer or phosphate buffered saline at approximately pH 7. Adding the solid to the prepared buffer makes it more difficult to obtain a clear solution (addition of NaOH is countered by buffering), but if the solid is added to about half the final volume of water containing the alkaline form of the buffer (e.g., disodium phosphate), a clear solution will be obtained without the need to add NaOH. The pH can then be adjusted by adding the more acidic form of the buffer in water.⁶ Buffered solutions of 2-4% formaldehyde may be used for up to two weeks if stored in brown bottles at 2-8°C.⁵ If the solution is unbuffered, the pH may drop below 6.2-6.4. In this case, byproducts of paraformaldehyde decomposition (formic acid, gaseous formaldehyde, etc.) may form and give rise to formalin pigment. The pigment must be removed from this solution to avoid false staining.

USAGE:

Commercial formaldehyde solutions ("formalin") contain 10-15% methanol to prevent the formaldehyde from polymerizing in storage. For most applications, the presence of methanol does not interfere. Formaldehyde has been used in the past for disinfecting sickrooms, clothing, linen and sickroom utensils. It has been used as a fumigant and in manufacturing synthetic resins.⁷

As a fixative in electron microscopy, it is necessary to use a methanol-free preparation.⁶ Paraformaldehyde is then added to basic buffer or water, heated with stirring to 55-60°C until it dissolves, forming a formaldehyde solution.

For use as a cross-linking agent for proteins or for fixing cells, one protocol suggests using a 4% solution and a 10-minute incubation at room temperature.⁸

P6148 and P1213 are both tested for formaldehyde equivalence by titration, with minimum 95% for each product. P1213 is additionally tested for formic acid content. Although the powder P6148 may dissolve more quickly than the prilled (beaded) P1213, the resulting solutions, are equivalent.

REFERENCES:

1. *Lange's Handbook of Chemistry*, 12th ed., p. 7-572.
2. *Aldrich 1996-1997 Catalog*, p. 1128.
3. Sigma MSDS information.
4. Sigma quality control data.
5. Sigma Clinical Technical Service.
6. Lewis, P.R. and Knight, D.P., *Staining Methods for Sectioned Material* (North-Holland Pub. Co., 1977), pp 9-10.

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NOTES: (continued)

7. *Merck Index*, 12th ed., #6974 (1996).
8. *Antibodies: A Laboratory Manual*, Harlow, E. and Lane, D. Eds. (Cold Spring Harbor Press, NY, 1988), p. 386.

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