Purpald®
(4-Amino-3-hydrazino-5-mercapto-1,2,4-triazole; 4-Amino-5-hydrazino-4H-1,2,4-triazole-3-thiol)
Catalog Numbers: 162892 and 08095
Technical Bulletin AL-145

**Properties:**
- CAS No. 1750-12-5
- Molecular formula: C$_2$H$_6$N$_6$S
- Formula weight: 146.17
- Melting point: 230–231 °C (dec.)
- Appearance: white powder

Dickinson and Jacobsen$^1$ have described the exceedingly specific and sensitive (up to $10^{-4}$ M sensitivity) reaction of aldehydes with Purpald® (1) to yield purple-to-magenta-colored 6-mercapto-s-triazolo[4,3-$b$]-s-tetrazines (2). Ketones, esters, formic acid, amides, hydroxylamines, quinones, uric acid, hydrazines and aminophenols do not react with 1 to yield purple products.

![Reactivity reaction](image)

**Procedure for Detection of Aldehydes**

One drop of the aldehyde is added to 10–20 mg of Purpald dissolved in 2 mL of 1 N sodium hydroxide. Aeration of the reactants produces the intense color within a few minutes. Very hindered aldehydes may require longer reaction times. **Table 1** lists some representative aldehydes and reaction times necessary for color changes.

<table>
<thead>
<tr>
<th>Aldehyde</th>
<th>Color</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-Hydroxypentanal</td>
<td>purple</td>
<td>&lt;30 seconds</td>
</tr>
<tr>
<td>Crotonaldehyde</td>
<td>purple</td>
<td>–</td>
</tr>
<tr>
<td>Benzaldehyde</td>
<td>purple</td>
<td>&lt;1 minute</td>
</tr>
<tr>
<td>2-Nitrobenzaldehyde</td>
<td>purple-brown</td>
<td>&lt;30 seconds</td>
</tr>
<tr>
<td>trans-Cinnamaldehyde</td>
<td>purple-brown</td>
<td>&lt;5 minutes</td>
</tr>
<tr>
<td>α-Methylcinnamaldehyde</td>
<td>purple</td>
<td>&lt;10 minutes</td>
</tr>
<tr>
<td>β-Phenylcinnamaldehyde</td>
<td>purple</td>
<td>–</td>
</tr>
<tr>
<td>4-Acetamidobenzaldehyde</td>
<td>purple-brown</td>
<td>&lt;5 minutes</td>
</tr>
<tr>
<td>2-Chloro-6-nitrobenzaldehyde</td>
<td>purple-brown</td>
<td>&lt;5 minutes</td>
</tr>
<tr>
<td>10-Methylantracene-9-carboxaldehyde</td>
<td>purple</td>
<td>very slow</td>
</tr>
</tbody>
</table>

* Tests were performed in the Aldrich Quality Control Laboratories
Applications
Since the original work by Dickinson and Jacobsen,1 a variety of methods and applications have been developed for the detection of aldehydes with Purpald. The reagent has been used in conjunction with enzymatic systems for the colorimetric detection of creatinine,2 free fatty acids,3 and uric acid.4 Also, triglycerides have been determined in biological samples.5-8

Other applications from current literature include the detection of:
- formaldehyde in periodate-oxidized glycols,9 air,10 vaccines,11 urea/formaldehyde resins,12,13 and plastic products;14
- acetaldehyde in liver tissue sections15 and on the surface of spoiling fruit;16
- formaldehyde generated from alkyl 2-cyanoacrylate vapor in air.17

Purpald is also used in TLC spray reagents,18 filter paper test strips,19 and phase-transfer catalysis.20

Storage and Stability
Purpald should be stored in well closed containers at room temperature. It is relatively stable under normal laboratory conditions.

Toxicity and Handling
To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated. The usual safe laboratory precautions and procedures should be observed when handling this material.

References