

采油用聚合物驱油剂

Polymer oil displacement agent for oil extraction

产品概述

【外观】本品外观一般呈无色、白色或黄色可自由流动的均匀液体。

【物理化学性质】采油用聚合物驱油剂是一种用于驱出储油孔隙中原油的油田化学品，通过聚合物溶液的携带作用，能够提高驱油效率和采收率，产品具有抗剪切性和抗盐性，在油藏中的应用效果受到可动油饱和度和油层温度等因素的影响。

性能特点

- 1、可减少能源浪费、降低能源消耗；
- 2、能够降低和改善流度比、提高采收率；
- 3、可增强携带力、提高微观洗油效果。

【用法及用量】本产品主要通过注入水中加入，推荐加量一般在 0.1%~0.2%，或根据现场情况确定用量。

技术指标

表 1 I 型驱油用聚合物产品技术要求

序号	项 目	系列黏均相对分子质量下不同类型指标											
		3×10 ⁴ ~≤M<5×10 ⁴			5×10 ⁴ ≤M<7×10 ⁴			7×10 ⁴ ~<M<9.5×10 ⁴			9.5×10 ⁴ ≤M<12×10 ⁴		
		A类指标	B类指标	C类指标	A类指标	B类指标	C类指标	A类指标	B类指标	C类指标	A类指标	B类指标	C类指标
1	外观	白色粉末	1	非白色	白色粉末	1	非白色	白色粉末	/	非白色	白色粉末	/	非白色
2	固含量	>88%	85%~<88%	<85%	>88%	85%~<88%	<85%	>88%	85%~<88%	<85%	≥88%	85%~<88%	<85%
3	粒度	≥1.00mm	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%
		≤0.20mm	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%
4	水解度	23%~27%	20%~<23%	<20%或>27%	23%~27%	20%~<23%	<20%或>27%	23%~27%	20%~<23%	<20%或>27%	23%~27%	20%~<23%	<20%或>27%
5	特性黏数，mL/g	703~<985	985~<1049	<1049	985~<1230	1230~<1287	<1287	1230~<1505	1505~<1557	<1557	≥1505	1	<1505
6	黏均相对分子质量	3.0×10 ⁴ ~<5.0×10 ⁴	5.0×10 ⁴ ~<5.5×10 ⁴	<3.0×10 ⁴ 或>5.5×10 ⁴	5.0×10 ⁴ ~<7.0×10 ⁴	7.0×10 ⁴ ~<7.5×10 ⁴	<3.0×10 ⁴ 或>7.5×10 ⁴	7.0×10 ⁴ ~<9.5×10 ⁴	9.5×10 ⁴ ~<10.0×10 ⁴	<7.0×10 ⁴ 或>10.0×10 ⁴	≥9.5×10 ⁴	/	<9.5×10 ⁴
7	表观黏度(标准盐水I体系)mPa·s	>9	8~<9	<8	>14	12~<14	<12	≥19	7~<19	<17	>31	/	<31
8	过滤因子	1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0
9	水不溶物	≤0.2%	/	>0.2%	≤0.2%	/	>0.2%	≤0.2%	/	>0.2%	≤0.2%	/	>0.2%
10	溶解时间，min	≤120	1	>120	≤120	1	>120	≤120	/	>120	≤120	/	>120
11	残余单体	≤0.05%	/	>0.05%	≤0.05%	1	>0.05%	≤0.05%	/	>0.05%	≤0.05%	/	>0.05%

表 1(续)

序号	项 目	系列黏均相对分子质量下不同类型指标											
		12×10 ⁴ ~<M<16×10 ⁴			16×10 ⁴ <M<19×10 ⁴			19×10 ⁴ <M<22×10 ⁴			22×10 ⁴ ~<M<25×10 ⁴		
		A类指标	B类指标	C类指标	A类指标	B类指标	C类指标	A类指标	B类指标	C类指标	A类指标	B类指标	C类指标
1	外观	白色粉末	1	非白色	白色粉末	/	非白色	白色粉末	/	非白色	白色粉末	/	非白色
2	固含量	>88%	85%~<88%	<8	>88%	85%~<88%	<85%	>88%	85%~<88%	<85%	>88%	85%~<88%	<85%
3	粒度	≥100mm	≤5.0%	>5.0%~10.0%	%	≤5.0%	>5.0%~10.0%	10.0%	≤5.0%	>5.0%~10.0%	10.0%	≤5.0%	>5.0%~10.0%
		≤0.20mm	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%	10.0%	5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%
4	水解度	23%~27%	20%	20%或>27%	23%~27%	20%~<23%	<20%或>27%	23%~27%	20%~<23%	<20%或>27%	23%~27%	20%~<23%	<20%或>27%
5	特性黏数，mL/g	>1756		<1756	>2123	/	<2123	>2378	/	<2378	>2619	/	<2619
6	黏均相对分子质量	≥12×n		<12×10 ⁴	≥16×10 ⁴	1	16×10 ⁴	≥19×10 ⁴	1	<19×10 ⁴	≥22×10 ⁴	/	<22×10 ⁴
7	表观黏度(标准盐水I体系)mPa·s			<40	≥45	44~<45	<44	>50	48~<50	<48	>55	53~<55	<53
8	过滤因子	≤1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0
9	水不溶物	≤0.2%	1	>0.2%	<0.2%	1	>0.2%	<0.2%	/	>0.2%	≤0.2%	/	>0.2%
10	溶解时间，min	≤120	/	>120	≤120	/	>120	≤120	/	>120	≤120	/	>120
11	残余单体	≤0.05%	/	>0.0	≤0.05%	1	>0.05%	≤0.05%	/	>0.05%	≤0.05%	1	>0.05%

表 1(续)

序号	项 目	系列黏均相对分子质量下不同类型指标								
		25×10 ⁴ ≤M<30×10 ⁴			30×10 ⁴ ≤M<35×10 ⁴			35×10 ⁴ ≤M<40×10 ⁴		
		A类指标	B类指标	C类指标	A类指标	B类指标	C类指标	A类指标	B类指标	C类指标
1	外观	白色粉末	/	非白色	白色粉末	/	非白色	白色粉末	/	非白色
2	固含量	≥88%	85%~<88%	<85%	≥88%	85%~<88%	<85%	>88%	85%~<88%	<85%
3	粒度	≥1.00mm	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%
		≤0.20mm	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%
4	水解度	23%~27%	20%~<23%	<20%或>27%	23%~27%	20%~<23%	<20%或>27%	23%~27%	20%~<23%	<20%或>27%
5	特性黏数，mL/g	≥2850	/	<2850	≥3214	/	<3214	≥3559	/	<3559
6	黏均相对分子质量	>25×10 ⁴	/	<25×10 ⁴	30×10 ⁴	/	<30×10 ⁴	>35×10 ⁴	/	<35×10 ⁴
7	表观黏度(标准盐水II体系)mPa·s	≥40	38~<40	<38	≥45	43~<45	<43	>50	48~<50	<48
8	过滤因子	<2.0	>2.0	/	≤2.0	>2.0	1	≤2.0	>2.0	/
9	水不溶物	≤0.2%	/	>0.2%	≤0.2%	/	>0.2%	≤0.2%	/	>0.2%
10	溶解时间，mi	≤120	/	>120	≤120	/	>120	≤120	/	>120
11	残余单体	≤0.05%	/	>0.05%	≤0.05%	/	>0.05%	≤0.05%	/	>0.05%

注：M——黏均相对分子质量。

Product Overview

[Appearance] This product generally appears as a colorless, white, or yellow, freely flowing, uniform liquid.

Polymer oil displacement agent for oil recovery is an oilfield chemical used to drive out crude oil from reservoir pores. Through the carrying effect of polymer solution, it can improve oil displacement efficiency and recovery rate. The product has shear resistance and salt resistance, and its application effect in reservoirs is affected by factors such as movable oil saturation and reservoir temperature.

Characteristics

1. Can reduce energy waste and decrease energy consumption;
2. Can reduce and improve the flowability ratio and increase the recovery rate;
3. It can enhance the carrying capacity and improve the micro oil washing effect.

【 Usage and Dosage 】 This product is mainly added to the injected water, and the recommended dosage is generally between 0.1% and 0.2%, or the dosage can be determined according to the on-site situation.

Technical Specification

Table 1 Technical Requirements for Polymer Products for Type I Oil Displacement

serial number	project	Different types of indicators under series viscosity average relative molecular weight											
		3×10 ⁴ ≤M<5×10 ⁶			5×10 ⁶ ≤M<7×10 ⁶			7×10 ⁶ ≤M<9.5×10 ⁶			9.5×10 ⁶ ≤M<12×10 ⁶		
		class a indicator	Class B indicator	Class C indicator	A-class indicators	Class B indicator	Class C indicator	class a indicator	Class B indicator	Class C indicator	class a indicator	Class B indicator	Class C indicator
1	appearance	white powder	1	Non white	white powder	1	Non white	white powder	/	Non white	white powder	/	Non white
2	solid content	>88%	85%~<88%	<85%	>88%	85%~<88%	<85%	>88%	85%~<88%	<85%	≥88%	85%~<88%	<85%
3	gr	≥1.00mm	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%
		≤0.20mm	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%	>10.0%	≤5.0%	>5.0%~10.0%	>10.0%	<5.0%	>5.0%~10.0%
4	degree of hydrolysis	23%~27%	20%~<23%	<20% or>27%	23%~27%	20%~<23%	<20% or>27%	23%~27%	20%~<23%	<20% or>27%	23%~27%	20%~<23%	<20% or>27%
5	Characteristic viscosity, mL/g	703~<985	985~<1049	<703 or>1049	985~<1230	1230~<1287	<985 or>1287	1230~<1505	1505~<1557	<1230 or>1557	≥1505	1	<1505
6	viscosity-average molecular weight	3.0×10 ⁴ ~<5.0×10 ⁴	5.0×10 ⁴ ~<5.5×10 ⁴	<3.0×10 ⁴ or>5.5×10 ⁴	5.0×10 ⁴ ~<7.0×10 ⁴	7.0×10 ⁴ ~<7.5×10 ⁴	<3.0×10 ⁴ or>7.5×10 ⁴	7.0×10 ⁴ ~<9.5×10 ⁴	9.5×10 ⁴ ~<10.0×10 ⁴	<7.0×10 ⁴ or>10.0×10 ⁴	≥9.5×10 ⁴	/	<9.5×10 ⁴
7	apparent Viscosity (Standard Saltwater I System) mPa·s	>9	8~<9	<8	>14	12~<14	<12	≥19	7~<19	<17	>31	/	<31
8	filter factor	1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0
9	water-insoluble substance	≤0.2%	/	>0.2%	≤0.2%	/	>0.2%	≤0.2%	/	>0.2%	≤0.2%	/	>0.2%
10	Dissolution time, min	≤120	1	>120	≤120	1	>120	≤120	/	>120	≤120	/	>120
11	Residual Monomer	≤0.05%	/	>0.05%	≤0.05%	1	>0.05%	≤0.05%	/	>0.05%	≤0.05%	/	>0.05%

Table 1 (Continued)

serial number	project	Different types of indicators under series viscosity average relative molecular weight											
		12×10 ⁴ ≤M<16×10 ⁴			16×10 ⁴ ≤M<19×10 ⁶			19×10 ⁵ ≤M<22×10 ¹⁰			22×10 ⁴ ≤M<25×10 ⁴		
		class a indicat or	Class B indicat or	Class C indicat or	class a indicat or	Class B indicat or	Class C indicat or	class a indicat or	Class B indicat or	Class C indicat or	class a indicat or	Class B indicat or	Class C indicat or
1	appearance	white powder	1	Non white	white powder	/	Non white	white powder	/	Non white	white powder	/	Non white
2	solid content	>88%	85%	<8	>88%	85%~<88%	<85%	>88%	85%~<88%	<85%	>88%	85%~<88%	<85%
3	granularity	≥100mm	≤5.0%	>5.0%-10.0%	%	≤5.0%	>5.0%-10.0%	10.0%	≤5.0%	>5.0%-10.0%	10.0%	≤5.0%	>5.0%-10.0%
		≤0.20mm	≤5.0%	>5.0% 10.0%	>10.0%	≤5.0%	>5.0%-10.0%	10.0%	5.0%	>5.0%-10.0%	>10.0%	≤5.0%	>5.0%-10.0%
4	degree of hydrolysis	23%~27%	20%	20% Or>27%	23%~27%	20%~<23%	<20% or>27%	23%~27%	20%~<23%	<20% or>27%	23%~27%	20%~<23%	<20% or>27%
5	Characteristic viscosity, mL/g	>1756		<1756	>2123	/	<2123	>2378	/	<2378	>2619	/	<2619
6	viscosity-average molecular weight	≥12×n		<12×10 ⁴	≥16×10 ⁴	1	16×10 ⁴	≥19×10 ⁴	1	<19×10 ⁴	≥22×10 ⁴	/	<22×10 ⁴
7	apparent Viscosity (Standard Saltwater I System) mPa·s			<40	≥45	44~<45	<44	>50	48~<50	<48	>55	53~<55	<53
8	filter factor	≤1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0	≤1.5	>1.5~3.0	>3.0
9	water-insoluble substance	≤0.2%	1	>0.2%	<0.2%	1	>0.2%	<0.2%	/	>0.2%	≤0.2%	/	>0.2%
10	Dissolution time, min	≤120	/	>120	≤120	/	>120	≤120	/	>120	≤120	/	>120
11	Residual Monomer	≤0.05%	/	>0.0	≤0.05%	1	>0.05%	≤0.05%	/	>0.05%	≤0.05%	1	>0.05%

表2 II型驱油用聚合物产品技术要求

序号	项 目		技术要求
1	外观		白色粉末
2	固含量		≥89. 0%
3	粒度	≥1. 00mm	≤5. 0%
		≤0. 15mm	≤5. 0%
4	水解度		≤24. 0%
5	特性黏数, mL/g		≥2500
6	表观黏度 (标准盐水III体系), mPa · s		≥12. 5
7	过滤因子		≤2. 0
8	水不溶物		≤0. 2%
9	溶解时间, min		≤120
10	残余单体		≤0. 05%
11	剪切黏度保留率		≥80. 0%
12	静吸附黏度保留率		≥80. 0%
13	热稳定性	75℃无氧条件下1个月后黏度保留率	≥90. 0%
		75℃无氧条件下3个月后黏度保留率	≥80. 0%

产品用途

【用途】采油用聚合物驱油剂的用途主要是通过增加注入水的粘度，改善油水流量比，从而提高原油采收率。聚合物驱油剂通常是通过在注入水中加入一定量的高分子聚合物（如聚丙烯酰胺），以增加注入水的粘度，调整吸水剖面，扩大波及体积。聚合物由于其固有的粘弹性，在流动过程中产生对油膜或油滴的拉伸作用，增加了携带力，从而提高微观洗油效率。

【用法及用量】本产品主要通过 在注入水中加入，推荐加量一般在 0. 1%~0. 2%，或根据现场情况确定用量。

包装与贮存

【包装】本产品一般用铁桶或塑料桶包装，可分净重 1000kg 吨桶和净重 200kg 、25kg 的不同规格，也可根据客户要求定制包装，运输过程中应轻装轻卸、避免碰撞、切勿倒置。

【存储条件】本产品应储存于干燥、阴凉、通风的库房，远离火种和热源，避免阳光直射和暴晒，以防止光解和氧化反应。

【保质期】1 年。



Table 2 Technical Requirements for Type II Polymer Products for Oil Displacement

serial number	project		Technical Requirements
1	appearance		white powder
2	solid content		≥89.0%
3	granularity	≥ 1.00mm	≤5.0%
		≤0.15 mm	≤5.0%
4	degree of hydrolysis		≤24.0%
5	Characteristic viscosity, mL/g		≥2500
6	Apparent viscosity (standard saline III system), mPa · s		≥ 12.5
7	filter factor		≤2.0
8	water-insoluble substance		≤0.2%
9	Dissolution time, min		≤120
10	Residual Monomer		≤0.05%
11	Shear viscosity retention rate		≥80.0%
12	Static adsorption viscosity retention rate		≥80.0%
13	thermal stability	Viscosity retention rate after one month under anaerobic conditions at 75 °C	≥90.0%
		Viscosity retention rate after 3 months under anaerobic conditions at 75 °C	≥80.0%

Applications

The main use of polymer oil displacement agents for oil recovery is to increase the viscosity of injected water, improve the oil-water flow ratio, and thus increase crude oil recovery. Polymer oil displacement agents usually increase the viscosity of injected water, adjust the water absorption profile, and expand the swept volume by adding a certain amount of polymer (such as polyacrylamide) to the injected water. Polymers, due to their inherent viscoelasticity, exert a stretching effect on oil films or droplets during the flow process, increasing the carrying force and thus improving the microscopic oil washing efficiency.

【 Usage and Dosage 】 This product is mainly added to the injected water, and the recommended dosage is generally between 0.1% and 0.2%, or the dosage can be determined according to the on-site situation.

Package and Storage

[Packaging] This product is generally packaged in iron or plastic drums, and can be divided into different specifications of net weight 1000kg ton drums, net weight 200kg, and 25kg. Packaging can also be customized according to customer requirements. During transportation, it should be loaded and unloaded gently, avoid collisions, and do not invert.

[Storage Conditions] This product should be stored in a dry, cool, and ventilated warehouse, away from fire and heat sources, and avoid direct sunlight and exposure to prevent photolysis and oxidation reactions.

Shelf life: 1 year.

