P-ASC

CEMENTING SERVICE BULLETIN

11/29/91

P-ASC (PETROCHEM-ACCELERATOR SODIUM CHLORIDE)

TECHNICAL DATA

P-ASC can be used both as an accelerator or retarder depending on the concentration in which it is used. This product is actually common salt and it is calculated according to the weight of the water (BWOW). For concentrations between 10-20%, it generally does not affect a slurry in any way. However, from 20 % to saturation point, it retards slurries at lower temperatures. Concentrations to a maximum of 10 % are used for accelerating p purposes.

PROPERTIES

PRODUCT	FORM	SP. GR.	PACKAGING
P-ASC	WHITE CRYSTALS	2.16	70 lb/ft3

SAFETY

See Material Safety Data Sheet

DISCUSSION:

CONCENTRATION OF SODIUM CHLORIDE USED

Concentrations of 1-10% sodium chloride accelerate most cement systems. The most effective results are seen when concentrations of 3-5 % are used. Another advantage of salt is that it performs as a strength accelerator without affecting thickening time properties in P-EBA cements.

BONDING IMPROVEMENTS

Salts in slurry solution (i.e. dissolved in the slurry) can be applied to enhance bonding. An example of this is seen in the cementing of zones sensitive to fresh water cement filtrate. Certain shale's contain clays that will swell and slough in the presence of fresh water filtrates. The ideal situation occurs when the salinity of the formation matches the salt content of the slurry. If this cannot be determined, a 3.0% (BWOW) salt solution is used to inhibit the swelling of the clay. Salt saturated solutions bring the sloughing of most shale's to a minimum. If a string of pipe has to be set through a zone containing potash or salt, additional salt should be placed to saturate the mix water. This could prevent the creation of a firm bond of cement to the salt. If afresh water slurry makes contact with the salt, it will dissolve salt from the zone. This can be rectified by the use of a salt saturated slurry. It works because this will bond readily to the formation without removing additional salt.

REDUCTION OF PERMEABILITY DAMAGE

The permeability of a core can be damaged by the influx of cement filtrate. This problem is more prevalent in shaly or dirty sandstone. However, damage in the most sensitive sandstones can be prevented to an extent with a 3.0% slurry.

ABILITY TO EXPAND

After most salt slurries have set, they have a tendency to expand slightly. This is experienced in a 50:50 pozzolan and neat cement systems. After one week, linear expansion amounting to 0.099 % has been measured.

FLOW PROPERTIES OF A SLURRY

Excessive free water can be minimized at higher water requirements with use of salt-saturated slurries in preference to fresh water slurries. Salt is also an effective dispersant for cement. It has been seen that high water salt saturated slurries have lower viscosities than a non salt saturated 15.6 lbs/gal water slurry.

CALCULATIONS FOR SLURRY VOLUMES

The calculations for powdered additives are easily carried out using the absolute volumes of the respective materials. However, for additives like sodium chloride, the concentration of salt would alter other factors. Hence, it is necessary to calculate the quantity of salt required for each sack of cement for whatever application.

TABLE I

PROPERTIES OF SODIUM CHLORIDE SOLUTIONS AT 80°F

% Salt BWOW	Sp. Gr. at 80°F	Density lb/gal	Expansion Factor gal/gal
0	0.9966	8.316	1.000
1	1.006	8.370	1.004
2	1.012	8.419	1.008
3	1.019	8.476	1.011
4	1.025	8.525	1.015
5	1.031	8.577	1.019
6	1.037	8.630	1.022
8	1.048	8.716	1.031
10	1.060	8.817	1.038
12	1.072	8.917	1.045
14	1.084	9.016	1.052
16	1.094	9.105	1.060
18	1.105	9.193	1.068
20	1.116	9.287	1.075
22	1.127	9.372	1.083
24	1.137	9.465	1.090
26	1.148	9.548	1.098
28	1.157	0.629	1.106
30	1.168	9.718	1.113
32	1.178	9.797	1.121
34	1.188	9.884	1.128
37	1.202	9.999	1.140

Multiply gallon of mix water by the expansion factor to obtain gallons of the brine.

SALT REQUIREMENT FOR VARIOUS CONCENTRATIONS BY WEIGHT OF TABLE II WATER

Pounds Salt for Particular Percentages

UNITS

Water gal/sk	1%	3%	5%	10%	18%	Sat
1	.083	.250	.416	.832	1.498	3.1
2	.166	.449	8.321	.664	2.995	6.2
3	.250	.749	1.248	1.496	4.492	9.3
4	.333	.998	1.664	3.328	5.990	12.4
5	.416	1.248	2.080	4.160	7.488	15.5
6	.499	1.497	2.496	4.992	8.986	18.6
7	.582	1.747	2.912	5.824	10.483	21.7
8	.666	1.997	3.328	6.656	11.981	24.8
9	.749	2.246	3.744	7.488	13.478	27.9
10	.832	2.496	4.160	8.320	14.976	31.0

TENTHS

0.1	.008	.025	.042	.083	.150	.31
0.2	.017	.045	.083	.166	.300	.62
0.3	.025	.075	.125	.250	.449	.93
0.4	.033	.100	.166	.333	.599	1.24
0.5	.042	.125	.208	.416	.750	1.55
0.6	.050	.150	.250	.499	.898	1.86
0.7	.058	.175	.291	.582	1.048	2.17
0.8	.067	.200	.333	.666	1.198	2.48
0.9	.075	.225	.374	.749	1.348	2.79

HUNDREDTHS

0.01	.001	.003	.004	.008	.015	.031
0.02	.002	.005	.083	.017	.030	.062
0.03	.003	.008	.013	.025	.050	.093
0.04	.003	.010	.017	.033	.060	.124