Stability Study for Folic Acid 5mg Tablets

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Abstract

This study was to investigate the physicochemical and microbiological stability of Folic acid 5mg tablets, chemical stability and physical parameters as appearance, hardness, friability, water content, dissolution and disintegration time was studied according to the United States Pharmacopeia USP 37 and BP 2015 using fresh samples. The Folic acid tablets was chemically, physically and microbiologically stable for not less than 36 months.

Keywords: hardness, friability, dissolution, disintegration, pharmacopeia.

Introduction

Folic acid is used for reducing the risk of getting colorectal cancer. Increasing consumption of dietary folate and supplemental folic acid seems to lower the chances of developing colon cancer, but does not seem to help people who already have colon cancer. Folic acid is used also for reducing the risk of pancreatic cancer, reducing the risk of breast cancer, Depression, when used with conventional antidepressant medicines, treating a skin disease called vitiligo, gum problems due to a drug called phenytoin when applied to the gums and treating gum disease during pregnancy, when used in mouthwash [1,2].

Folic acid appearance is yellowish or orange, crystalline powder practically insoluble in water and in most organic solvents. It dissolves in dilute acids and in alkaline solutions. The chemical formula of Folic acid is $C_{19}H_{19}N_7O_6$ (Figure 1).[1,3]

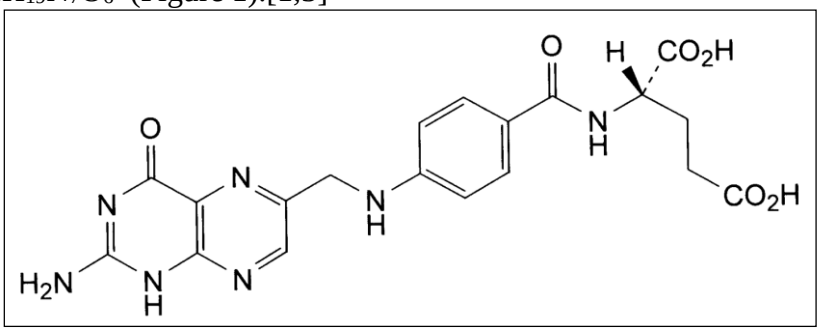

Figure 1. Chemical formula of Folic acid ($C_{19}H_{19}N_7O_6$)

MATERIALS AND METHODS

In this study the trade name (AMAFOL 5 mg tablets) was used to investigate for the determination of expiration date. The below apparatus and equipment are used in this study :

1. Electronic balance.
2. Drying oven.
3. Friability tester.
4. Disintegration time tester.
5. Hardness tester.
6. HPLC (High Performance Liquid Chromatography).

The preparation and analysis of Folic acid are investigated according to the United States Pharmacopeia USP 37 [4]. The following parameters was studied for the stability of Folic acid tablets :

1. Assay of Folic acid.
2. Appearance.
3. Hardness.
4. Friability.
5. Water content.
6. Dissolution.
7. Disintegration time.
8. Microbiology.

Results and Discussion

Assay of Folic acid

The data in table (1) express the long term testing at (30 ± 2)°C and (40 ± 2)°C and showed no significant changes and the assay after 36 months from its initial value which was less than 5% of change.

Table.1 Folic acid Assay long term testing at (30 ± 2)°C and (40 ± 2)°C

Time (months)	Folic acid at 30 °C (%)	Folic acid at 40 °C (%)
0	101.9	101.9
3	101.5	101.3
6	100.8	100.6
9	100.4	100.1
12	100.0	99.5
15	99.6	99.0
18	99.3	99.4
21	98.7	98.5
24	98.2	97.8
30	97.6	97.1
36	97.0	96.6
% loss in 36 months	**4.8 %**	**5.2 %**

Appearance

The data in table (2) of the long term testing at (30 ± 2)°C and (40 ± 2)°C showed no chanced in appearance of Folic acid tablets during and after 36 months.

Table.2 Appearance test of Folic acid tablets for long term testing at (30 ± 2)°C and (40 ± 2)°C

Time (months)	Yellow uncoated tablets (at 30 °C)	Yellow uncoated tablets (at 40 °C)
0	No change	No change
3	No change	No change
6	No change	No change
9	No change	No change
12	No change	No change
15	No change	No change
18	No change	No change
21	No change	No change
24	No change	No change
30	No change	No change
36	No change	No change

Hardness

The hardness test results of uncoated tablets was comply with the test for hardness of tablets and capsules as per BP 2015 (Table 3).

Table.3 Hardness test of Folic acid tablets for long term testing at (30 ± 2)°C and (40 ± 2)°C

Time (months)	Uncoated tablets hardness (at 30 °C)	Uncoated tablets hardness (at 40 °C)
0	4.9	4.9
3	4.9	4.9
6	4.9	4.9
9	4.9	4.9
12	4.9	4.9

15	4.9	4.9
18	4.9	4.9
21	4.9	4.9
24	4.9	5.0
30	4.9	5.0
36	4.9	5.0

Friability

The friability test results in table (4) of the long term testing at (30 ± 2)°C and (40 ± 2)°C showed no significant changes in the friability of Folic acid tablets.

Table.4 Friability test of Folic acid tablets for long term testing at (30 ± 2)°C and (40 ± 2)°C

Time (months)	Friability at 30 °C (%)	Friability at 40 °C (%)
0	0.6	0.6
3	0.6	0.6
6	0.6	0.6
9	0.6	0.6
12	0.6	0.6
15	0.6	0.6
18	0.6	0.6
21	0.6	0.6
24	0.6	0.5
30	0.6	0.5
36	0.5	0.5

Water content

The water content test results in table (5) of the long term testing at (30 ± 2)°C and (40 ± 2)°C showed no significant changes in tests results.

Table.5 Water content test of Folic acid tablets for long term testing at (30 ± 2)°C and (40 ± 2)°C

Time (months)	Water content at 30 °C (%)	Water content at 40 °C (%)
0	2.9	2.9
3	2.9	2.9
6	2.9	2.9
9	2.9	2.9
12	2.9	2.9
15	2.9	2.9
18	2.9	2.8
21	2.8	2.8
24	2.8	2.7
30	2.8	2.7
36	2.8	2.6

Dissolution

The dissolution test results in table (6) of the long term testing at (30 ± 2)°C and (40 ± 2)°C showed no significant changes within the 36 months of testing period.

Table.6 Dissolution test of Folic acid tablets for long term testing at (30 ± 2)°C and (40 ± 2)°C

Time (months)	Dissolution at 30 °C (%)	Dissolution at 40 °C (%)
0	89	89
3	89	89
6	89	89
9	89	88
12	88	87
15	87	86
18	86	85

21	86	84
24	85	84
30	85	83
36	84	82

According to USP 37 requirements of Folic acid tablets not less than 80% of the labeled amount of ($C_{19}H_{19}N_7O_6$) is dissolved in 20 minutes.

Disintegration time

The disintegration time test results in table (7) of the long term testing at (30 ± 2)°C and (40 ± 2)°C express the stability of tablets within the 36 months of testing period.

Table.7 Disintegration time test of Folic acid tablets for long term testing at (30 ± 2)°C and (40 ± 2)°C

Time (months)	Disintegration time at 30 °C (min)	Disintegration time at 40 °C (min)
0	11.0	11.0
3	11.0	11.0
6	11.0	11.0
9	11.5	11.5
12	11.5	11.5
15	11.5	11.5
18	11.5	12
21	11.5	12
24	12.0	12
30	12.0	12.5
36	12.5	13.5

Microbial limit test

The data of multiple tube method in table (8) and (9) for aerobic count plate method for molds and yeasts showed comply with USP 37 microbiology tests for tablets.

Table.8 Microbial limit test of Folic acid tablets for long term testing at (30 ± 2)°C

Time (months)	Pathogenic	Non pathogenic (Molds and Yeasts/ml)	Non pathogenic (Aerobic count/ml)
1	Nil	less than 10	43
3	Nil	less than 10	43
6	Nil	less than 10	43
12	Nil	less than 10	43
18	Nil	less than 10	43
24	Nil	less than 10	43
30	Nil	less than 10	43
36	Nil	less than 10	44

Table.9 Microbial limit test of Folic acid tablets for long term testing at (40 ± 2)°C

Time (months)	Pathogenic	Nonpathogenic (Molds and Yeasts/ml)	Nonpathogenic (Aerobic count/ml)
1	Nil	less than 10	43
3	Nil	less than 10	43
6	Nil	less than 10	43
12	Nil	less than 10	43
18	Nil	less than 10	43
24	Nil	less than 10	43
30	Nil	less than 10	43
36	Nil	less than 10	43

All the data of physicochemical and microbiological tests of Folic acid 5mg tablets investigated in this study showed comply with USP 37 and BP 2015 at (30 ± 2)°C within the 36 months of tests.

Conclusion

The result of this study suggest an expiration date of not less than 36 months (3 years) for Folic acid 5mg tablets at (30 ± 2)°C.

References

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